THE CARE
OF THE
SCHOOL CHILD

Edited by
JAMES KERR, M.A., M.D.

Introduction by
BISHOP BOYD CARPENTER, K.C.V.O.

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THE CARE OF THE SCHOOL CHILD

A COURSE OF LECTURES DELIVERED UNDER THE AUSPICES OF THE NATIONAL LEAGUE FOR PHYSICAL EDUCATION AND IMPROVEMENT, MAY TO JULY 1916

EDITED BY

JAMES KERR, M.A., M.D., D.P.H.

WITH AN INTRODUCTION BY

BISHOP BOYD CARPENTER, K.C.V.O.

LONDON

THE NATIONAL LEAGUE FOR PHYSICAL EDUCATION AND IMPROVEMENT

4 TAVISTOCK SQUARE, W.C.

1916

INTRODUCTION

THE men who have given the following lectures are experts in their several departments of life. They have given freely and readily the ripe fruits of their knowledge and experience, first to those who can use them for the good of the children, and now to the public at large. Their generous patriotism deserves our thanks. Without reward or reserve they are giving to us in these lectures knowledge beyond all price. Their conduct stands out in noble contrast with the conduct of those who have devised ways of making profit out of the sorrows, losses, and heavy burdens of this time. The patriotic motto "None of us to be the richer for the War" does not appeal to those who measure values by money. It is an ignoble and deceitful standard of measurement. The welfare of man is the Divine standard; and this is the measure which these lectures apply to life.

The stern events of our time are awakening people to the value of human life, which has so long been reckoned as cheap, and used too often as a means of attaining some baser end. Economists have sometimes worked out the value of man in pounds, shillings, and pence. To-day we know that man is more precious than gold, and his welfare ought to be the recognized purpose of

our efforts. The lesson of the following lectures is one and the same: healthy, honest, truthful, self-ruling and self-sacrificing children are the best asset of nations.

The need of keeping such an aim clearly and constantly before us will be evident to those who read these lectures. They will realize how much needs to be done when they know (p. 11) that out of more than 294,000 children inspected in the London County Council Schools, over 100,000 were found to require treatment—i.e. about one-third of those inspected needed medical attention. Take one particular and most important matter of health—the teeth—and observe that when 56,491 children were inspected in 1914, as many as 46,290 required a dentist's care (p. 12). Caries, which one dictionary describes as ulceration of bone, is found in increasing prevalence in the teeth of children as they grow older. At the age of three the percentage of dental caries was high, as much as 46 per cent.; but at sixteen the percentage had risen to 87·1 (pp. 95, 96). Read what we are told in these lectures about the eye and the ear, the nose and the tonsils, and the need for continued and vigilant care of growing children will be evident. We shall learn how we often blunder in our school methods because we fail to take a true and comprehensive view of child welfare.

Had space permitted, I should have liked to mention in detail some of the many striking and valuable things which are said in these lectures. I can only say that to those who love their country, and realize how precious is every indi-

vidual to her national life, these lectures will be welcomed, as they help to point out the way by which the citizens of the future may be reared as strong, vigorous, self-governing, equable and happy men and women.

If service to our fellow-men is a supreme duty in life, the end of education should be to make them serviceable. Schools can do much to promote this fitness for life, but, as is pointed out in these pages, to secure it we need wholesome influences in the home. If home and school join hands in the care of our children, bodily fitness and mental energy joined to wise development of moral and spiritual capacity may be the priceless inheritance of the citizens of our Empire in the glorious and difficult days to come.

W. BOYD CARPENTER.

LONDON,
September 1916.

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THE CARE OF THE SCHOOL CHILD

INTRODUCTORY LECTURE

By CYRIL COBB, M.V.O.,

Chairman of the Central Children's Care Sub-Committee of the Education Committee, London County Council.

I UNDERSTAND that the present course of lectures is intended to follow up a previous course which dealt with the welfare of the child before school age.

That your first course of lectures should have begun at the beginning and have dealt with infantile welfare before school age is as it should be. Vital statistics show that to be the proper way to attack the problem as a whole.[1]

[1] Infant mortality for the entire year :—

England and Wales	120·4
Durham	151·0
Glamorganshire	151·3
Herefordshire	75·8
Oxfordshire	73·0

Infant mortality under one week :—

England and Wales	24·3
Durham	33·8
Glamorganshire	24·8
Herefordshire	18·2
Oxfordshire	20·9

But to begin at the beginning is not the way that the British State tackles its problems, and certainly it has not attacked the problem of child welfare in that way. The State's interest in the general welfare of the child centred itself to begin with in the answer to the question, Is the child underfed? does it get *enough* to eat? and around the answer to that question has grown up, side by side with the School Care Committees, all the other kinds of beneficent action which are now bestowed on the children before, during, and after school life. Of course we have come to know since how small an element of the trouble lack of sufficient food really happens to be.

So in a roundabout way we were brought to a happy issue. Similarly one outstanding characteristic of our official classes, the consuming passion for inspection, has eventually brought about a real movement in the direction of medical treatment, adequately State-aided, first of all of "County Council complaints," and spreading through dental treatment, minor ailment treatment, and tuberculosis, to cover the entire needs of the school child.

A complete system of child welfare is therefore being evolved, and it is growing up *not* round Public Health Authorities, as one would expect, but round the Education Authority. This has had the great advantage of insuring that the system is uniformly administered over the

whole London area so far as the school child is concerned, instead of being divided up between the various Public Health Authorities throughout the County.

The supreme importance of wise measures of Public Health at the present time of national crisis, when we should be building up the coming generation of men and women, is in everybody's mind. The whole complex problem of social welfare is, of course, far wider than the questions that group themselves round the school and the school child, yet if these problems are to be attacked at all there is no better vantage-ground than our London schools with their three-quarter million of children, equal to one-tenth of our population.

Through the school and the official organizations that group themselves round the school we deal with :—

1. The provision of meals.[1]
2. Medical treatment of children.[2]
3. Juvenile employment.[3]
4. The general welfare of children.[4]
5. Cruelty and neglect of children.
6. Vacation Schools and Evening Recreation Centres.

[1] Provision of Meals Act, 1906 (Feeding).

[2] Educational Administrative Provisions Act, 1907 (Medical Inspection and Treatment).

[3] Labour Exchange Act, 1909 (After Care).

[4] Children Act, 1908.

Besides these there are the many unofficial and voluntary agencies working through the school in order to co-operate with them in all other kinds of assistance which do not come within the province of the Local Education Authority.

Now the great mass of all this detailed work is carried out by the School Care Committees, a wonderful organization of voluntary workers that has been in existence since School Board days, and which has developed in a remarkable manner of recent years.

This development has proved the inherent strength of the voluntary system. We were always told that voluntary effort would cease in all these activities if once officialized and "put on the rates." This has been largely true as far as money is concerned. Voluntary *funds* rapidly diminished for feeding necessitous children when it became optional to raise a halfpenny rate to pay for that service (April 1907); but it has been profoundly untrue as regards voluntary *service*. Although voluntary funds had entirely failed by 1909, there were then no less than 5,500 voluntary School Care Committee members, and in 1914 there were 8,000. When the School Board formed these committees officially in 1897 for schools classed as "necessitous," only half the schools were provided with these committees: there are at the moment only five schools in the whole of the

area without a School Care Committee. Even in these difficult days, when our numbers are somewhat depleted, we may congratulate ourselves on the fact that there is still so great a body of voluntary Care Committee workers who realize that there can be no personal service better bestowed than that which co-operates with parents and teachers in developing efficient citizens. As it is for this object that the School Care Committees exist and are as a body officially recognized, recruited, and organized, without, as we may hope, losing the advantage which their voluntary origin gives them.

Such committees consist of small groups of social workers, numbering usually from six to eight members and attached to each school. As I have said already, they are not "merely feeding committees but effective Care Committees, taking an active interest in the general welfare of the children and, in co-operation with their parents and all existing agencies, befriending them in a variety of ways."

In addition to the School Care Committee attached to each school, and of which there are about one thousand, there are twenty-seven local associations of Care Committees, consisting of not fewer than eighteen persons, two-thirds of whom are appointed from the School Care Committees of the districts which they serve. The duties of these local associations of Care Com-

mittees are to co-ordinate the general lines of policy of the School Care Committee and to arrange and manage the feeding centres.

Beyond these is the Children's Care Central Sub-Committee of the Education Committee of the London County Council.

With regard, then, to the duties of School Care Committees—firstly, the question of *feeding*. Here it is the duty of the School Care Committee "to determine what children are necessitous." This seems to resolve itself into the question whether the condition of the home is such that from some cause or another the parent *does not* provide the child with such food as will enable it to take full advantage of the education provided. The child must be fed till the home is mended and the cause of the child's inability removed. The difficult question of ascertaining exactly and accurately what the home conditions and circumstances are meets the Care Committee worker at every point in connection with child welfare.

The rules of the Council do not go further than to counsel and support the advisability of home visiting in order to find out these details, and the alternative method of the parent or guardian making application to the School Care Committee at its weekly meeting is regarded as the normal state of affairs. The practice, however, is better than the precept, and much home visiting is done.

Although means are devised in cases of difficulty to assist the School Care Committee through the Council's officials, school attendance officers, district organizers, and with a final resort to the Central Care Committee, yet no case paper can really be considered entirely adequate unless it contains the advice of the member of committee or the voluntary worker who has investigated the home as a "family friend visitor."

The majority of feeding cases present no difficulties. The head teacher's power of placing children on the feeding list as emergency cases is seldom abused. The School Care Committee is able to check the normal cases presented either by the head teacher or through the visitors, or on application by the parents, without too great a variation in the interpretation of the word "necessitous."

But where serious difficulties arise either in individual cases or with blocks of children in individual schools, they can almost always be traced either to the absence of home visiting altogether, to inadequate or uninstructed home visiting, or to the overruling of the home visitors' reports, because the School Care Committee itself for reasons of its own refuses to regard the results of investigation as the primary factor which should guide them. One may safely say that the Provision of Meals Act is carried out in accordance with the instructions of the Legislature just in

proportion as the home visiting is systematically carried out and acted upon.

The extension of the Council's activities from children "necessitous from lack of food" to all the other matters that affect their welfare from the standpoint of health has greatly increased the range of activities of the School Care Committees, and in proportion emphasized the importance of intelligent home visiting by the family friend visitor. A School Care Committee visitor of this type has now a mission not only to find out whether the family means are so limited as to prevent the proper nourishment of the particular child, but the Educational Administrative Provisions Act gives him a function of inquiry into the many other ills from which, from a health point of view, other children of the family may be suffering.

This brings us to consider the special duties of School Care Committees in regard to the second great division of their work—the medical inspection and treatment of school children. This is a very different problem from the feeding one, and presents many more complications to the visitor. After all, there are not a few parents who look without any aversion on the provision of free meals for their children: if the children can be put on the free meals list the parent is relieved of trouble and expense. Here the function of the home visitors is *not* to urge the free

meal treatment, but while checking the cases which are not really necessitous within the meaning of the Act to see that opportunity is given to the parent to profit by the Act wherever he is genuinely not in a position to provide sufficient food for the child. In the case of medical treatment, on the other hand, much persuasion is often required. It is often extremely difficult to induce the parent to take any steps to carry out the directions of the inspecting doctor, especially in the absence of actual suffering on the part of the child, and, further, it must be remembered that the payment of one shilling has to be made by the parent for each child treated, unless the Council is satisfied that the parent is unable to pay owing to circumstances other than his own default. Since necessity is not here the test, as is feeding, large numbers of parents have to make their contributions, whilst in the case of feeding the amount recovered from parents for meals supplied is quite negligible.

Medical inspection, as we have seen, is compulsory, medical treatment optional, but in each case the co-operation of the parent is desired and invoked, and this opens a wide field of useful service for the voluntary social worker for promoting the well-being of the children and ascertaining the needs of the home.

Medical inspection under the London County Council is arranged so that each child is in-

spected three times at least during its school career. Children as they enter and before they leave school are seen by the doctor, and also at an intermediate age, usually between eight and nine years. In addition any children noticeably ailing are brought forward through the head teacher, the school nurse, or the Care Committee, and examined as special cases.

The parents are advised when any of these examinations are arranged to take place in order that one or other may attend and give necessary information bearing upon the health of the child, and may also be informed at first hand of the doctor's opinion, and if any need for medical treatment of the child exists. Any parents who through work, illness, or home duties are prevented from being present are informed by the school nurse and the Care Committee of what has transpired at the medical examination and what ameliorative course should be pursued.

London School Care Committees are entitled to appoint a representative to attend these medical inspections of school children in order to ascertain the intentions of the parents in regard to medical treatment (Regulation 117). Thus at the very earliest stage the member of the Care Committee is brought into contact with the parent and the child. The cases arising out of inspection that require medical treatment have to be classified. The duty devolves upon the School Care Com-

mittee of deciding on the appropriate source from which treatment is to be obtained, whether a private doctor, a hospital, or a Council's treatment centre, or whether it is a case where guidance as to home care only is needed. Then the Care Committee, co-operating with the school nurse and the organizer, enters upon its campaign of inducing the parent to obtain the advice and treatment recommended. This involves "following up"—that is, seeing that after the first treatment has been given the parent takes advantage of the whole possibilities that the Council offers for ensuring that the child has that continuous treatment which means a cure.

The Council undertakes that certain provision is made in every district whereby treatment may be obtained at a fixed rate; this fixed rate of a shilling per ailment treated being reducible to a penny in the case of parents who are unable to afford the usual sum. At the same time the provision made by the Council is never thrust upon the parent, but free choice is allowed in the matter.

Later all children notified by the school doctor as suffering from certain defects are re-examined at school in order to see that the steps taken by the parents and Care Committee together have been effective. During last year (1914) the number of children inspected in the London County Council schools was 294,026, and of this number 101,000 were found to require treatment.

Eighty-six thousand children received treatment at medical centres or hospitals under the Council's scheme, while in addition a considerable number obtained treatment privately or at hospitals not under contract with the Council.

The teeth of young children has lately been a special subject of consideration owing to the grave consequences which may arise through neglect of first teeth. Within the last two years special arrangements for examining the teeth of children between the years of six to eight have been gradually made by the Council to cover the whole of London, and dental centres to secure suitable treatment for these very young children have been established. The same procedure as to the notifying of defective teeth and scope for obtaining treatment is followed as in the case of other ailments, and often special powers of persuasion have to be exerted by the Care Committee because it is sometimes difficult to convince parents that defective teeth in the mouths of their younger children are as bad or worse than "the little foxes which spoil the grapes."

In 1914 56,491 children were inspected for dental purposes only throughout the London area, and of these 46,290 children were found to require treatment, so that it will be readily seen that without such special examination there would be grave menace of general undermining of health, which may now be arrested and eradicated.

It is evident that there is a very wide scope in all this for the friendly family visitor. Co-operation with the parent is the door to success—to persuade wherever possible, not to compel by official pressure. At first it was difficult to get the parents' co-operation, but things have been enormously improved, and although the Educational Administrative Provisions Act is not yet ten years old, the figures show that 80 per cent. of the parents attend the inspection of "entrants," 65 per cent. the age group eight to nine, and 55 per cent. the "leavers." Such good results are largely due to the work of the School Care Committee, and its importance cannot be exaggerated.

The Care Committee, together with the teachers, also keeps itself in touch with all those agencies doing remedial work outside the actual activities of the Council—boots and clothing and spectacles. It also helps in the matter of the children's holiday fund, of cleanliness and personal hygiene, which give so much trouble to the teachers within the schools, and which can be so much improved through a wise influence brought to bear upon the home. Play Centres and Vacation Schools are a further means of usefulness.

Many cases of cruelty and neglect under the Children Act, 1908, are reported through the agency of the School Care Committee. After local investigation has been made the doctors and superintendents warn the parents of the penal-

ties for neglect under the Act, and if no improvement results the case is referred to the National Society for the Prevention of Cruelty to Children.

A section of the Children's Care Central Subcommittee gives advice to the School Care Committee in specially difficult cases.

But there is the third great department of the Care Committee work.

After Care.—In order to give advice and assistance with regard to the employment of children after they leave school, the Council has recently adopted a scheme by which every boy and girl should be included and share advantages which were formerly limited to a much smaller number of school-leaving children. Few people doubt the importance of careful choice as to occupation upon leaving school, but all are not agreed as to exactly what part the Care Committee should play in the matter, so that necessarily criticism would arise upon the formulation of any scheme of a definitely comprehensive nature. These are early days, and in view of the industrial conditions which arise, and will become still more acute as a result of the European War, the best of schemes would probably require revision and modification, but the need for guidance and supervision in the early days of workaday life is increased, and not lessened, by the crisis through which as a nation we are passing. Therefore when parents are invited to conferences at school, or visited in their

homes by Care Committee workers anxious to know what plans parents are making for their children, or the children are making for themselves, and the head teacher talks to the boy or girl at school, all this must not be mistaken for the officiousness of a State machine trying to gather statistics, or the meddling of a busybody with other people's business, but rather the interest of the friendly worker who brings a wider outlook to the all-important matter of what is to happen to the children when they leave school.[1]

Care Committees refer suitable cases to Local Board of Trade Juvenile Advisory Committees, to the Skilled Employment and Apprenticeship Committees, or other agencies—e.g. M.A.B.Y.S.

The Care Committees have a further plan to keep in touch with school-leaving children until they reach the age of seventeen in all cases where parents are prevented from one cause or another from safeguarding the interests of their children. This, again, is the outcome not of officialdom but of friendliness, the spirit of brotherliness as opposed to that which does not trouble about the youth no longer directly under its control.

Such are some of the points in the wide field of usefulness wherein a School Care Committee member may co-operate, and it must be clear that many qualifications of heart and head are requisite for a competent "family friend visitor"

[1] Sixty thousand children leave London schools in a year.

We are told that in practical experience visitors sort themselves into two types: (1) those who visit on some definite point—e.g. feeding, medical treatment, teeth, after care; (2) those who visit to make friends with the family. The problem is to convert both kinds into a visitor who has the general welfare of the family as his objective, and is at the same time competent to deal with the specific matters of social work affecting the family. This points eventually to some much more systematic method of training social workers. There are many now who are well trained, but amongst the total number of Care Committee members these at present represent but a small proportion. To classify cases and to classify families requires a general all-round knowledge of social conditions which cannot be expected except from those who have had years of good training and experience.

Some day we may hope to see the whole area of social betterment, of which that part which concerns the children is but a small section uniformly treated through a comprehensive scheme. When that day comes it will be essential to have that kind of well-equipped "family friend visitor" that I have indicated.

Every year some fresh kind of State aid is put forward in order to cure some social ill. Of late years old age pensions, tuberculosis treatment, mental deficiency treatment, war pensions, Soldiers'

and Sailors' Aid Societies have been added to the other work of Guardians, Education and Public Health Authorities; and the Local Government Board had in contemplation a scheme for systematic treatment of all those questions which centre round infant life. The bestowal of all these benefits by the State is surely going to demand in the long run some corresponding return from the individuals benefited. I am asking myself whether the State-aided child of to-day is going to be the conscript of to-morrow. That might be a justification for so much State aid; but there will always be those who with some justification charge the State with the undermining of personal responsibility and the weakening of the national character by over-provision of State aid and assistance, and they may prove right if we are not extremely careful to direct matters on those sound lines upon which we have worked hitherto—the provision of every reasonable facility through the voluntary or official worker *to help the family to help itself*.

The statistics with regard to infantile mortality show that it is not the district or the county which possesses the highest technical skill or the greatest wealth of scientific appliances or the most elaborate and complete system of State control that can show the best figures. The important factor is clearly the *devotion of the mother*. To stimulate this and to re-awaken the sense of

parental duty and responsibility is the function of the friendly family visitor, and to my mind this is the principle which should dominate the whole range of activities which deal with the amelioration of the family.

THE PHYSICAL DEVELOPMENT OF THE SCHOOL CHILD

By R. E. ROPER, M.A., M.Ed.

The Relation of Physical and Mental Development.

Education is not so much a preparation for life as a part of life. The acquisition and correlation of experience begins at least as early as the first moment of separate existence, and continues till death. It is this acquisition and correlation of experience which constitutes education.

Whilst in this world the individual ego inhabits a body, through which it communicates with others. Whatever in school affects the development of this body (for good or ill) falls within the province of physical development. The subject is thus not one which can be confined to the gymnastic lesson or the game. You cannot afford to crowd it into an hour or so per week in training colleges or a few minutes a day in schools, to dismiss it summarily as handwork or class it with sewing or domestic economy, to entrust it to amateurs. Nothing but ignorant or dishonest reasoning can excuse the present position of physical education, the Cinderella of the schools.

Three diagrams (see p. 25) will show my meaning. The circle in each represents a full school day, the shaded part being physical development. In the first is shown the common idea of fifteen minutes or so a day for scientifically arranged exercise. The second gives room for theory (anatomy, physiology, or hygiene) as well as practice (in the gymnasium or elsewhere). The third, more complicated but truer to life, shows education no longer in watertight compartments, but as a wheel, the spokes of which are physical development and the hub (the centre for the co-ordination of all experience) is knowledge of self.

A proper system of physical development must consist of theory and practice, the former giving knowledge of the processes and needs of the body, the latter ensuring a feeling of bodily health, for the end of each term must see each child physically fitter than the beginning.

The Problem of Physical Development during School Life.

Consider a child of average health and vitality, aged about eight. For the next six or ten years the whole organization of its surroundings should aim at perfecting its individual powers. Suppose its home conditions are good. It comes to school, enters a building, reaches a room, and sits down in a desk to be taught. The chief characteristic

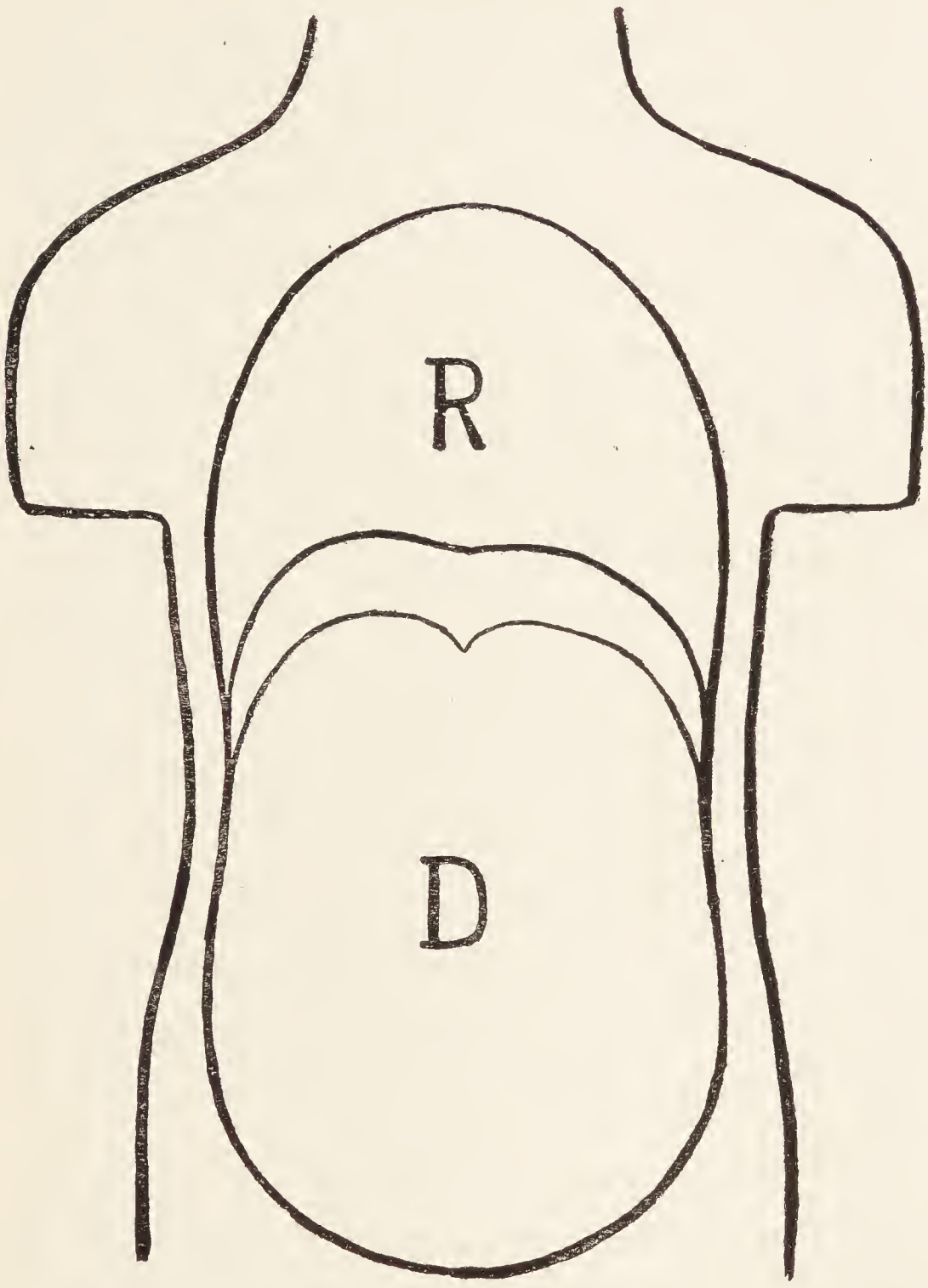
1.—The Sitting Position.

of school life to-day is lack of movement: for at least six hours a day—from getting up to going to bed—a child is sitting down. This is a quarter of its period of school life. Its growing body adapts itself to this habitual position in the following ways :—

Diagram 1 represents the main outlines of the trunk when seated. Notice the slope of the breast-bone and of the spine at the waist; the former has a direct effect upon respiration. (Remember that muscles tend to adapt themselves to a habit-length.)

Diagram 2 shows roughly the proportion of the spaces within the trunk for respiration and digestion. On sitting down the abdominal muscles relax, the contents of the lower part of the trunk tend to fall forward against them, and they take a new habit-length. The muscles round R tend to shorten, those round D to lengthen. The processes both of respiration and digestion are thus affected to the extent to which these muscles are employed in them.

Consider Diagrams 4, 5, and 6, in which the effect of prolonged sitting is shown on general carriage. No. 4 shows a reasonably erect figure, No. 5 repeats the sitting position, No. 6 shows some of the consequences when the erect position is assumed again, the signs referring to changes in the length of various groups of muscles. In groups lying near the surface of



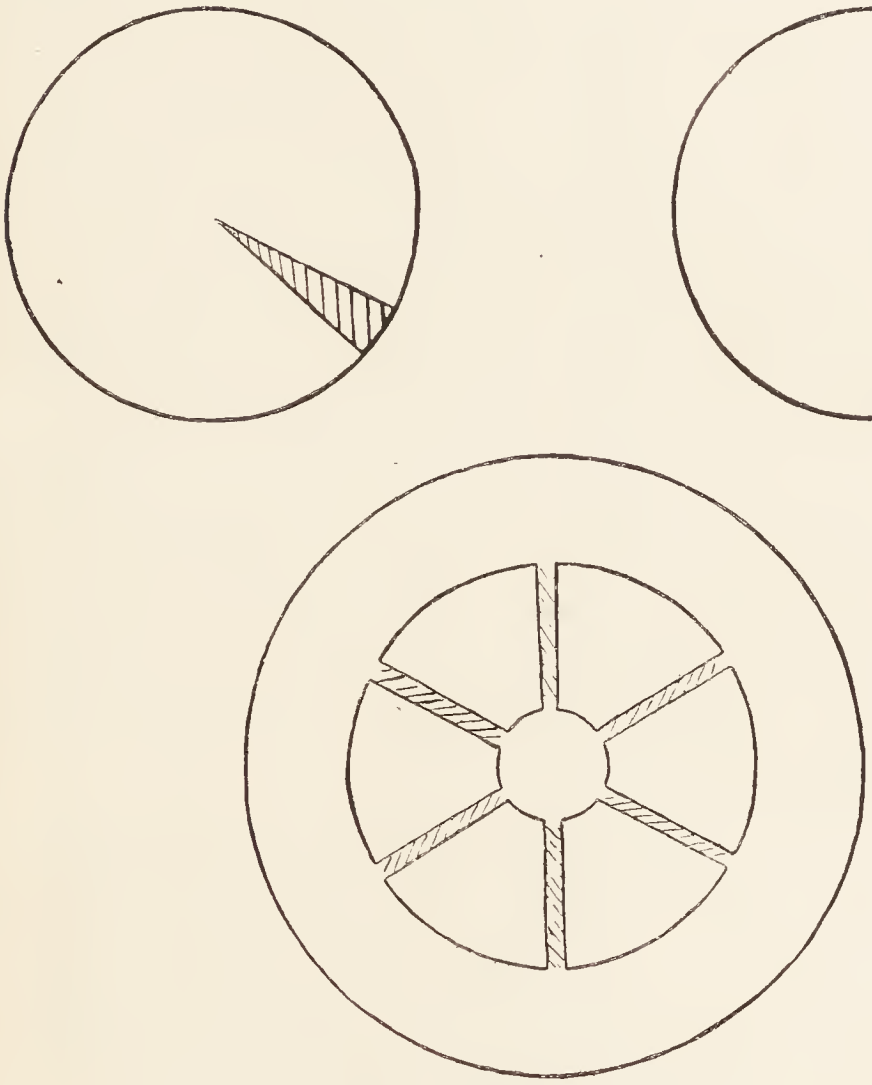
2.—Respiration and Digestion.

the body these changes are obvious: a very important group, however, is not so evident, running as it does from spine and hips to inside of thigh, and represented by the line A B. When sitting the thigh bone is moved nearer to the spine and A B is shortened; when standing B is fixed and A pulled forward, thus tending to produce a hollow back. It is necessary to analyse Fig. 6 from below upwards, as each lower fault increases those above it, and the most marked effect is thus in the upper part of the spine and chest.

The sitting position is the main physical factor with which we have to deal. "Mental" work must be done at a definite "physical" sacrifice, caused directly by the conditions of school life. The body develops through movement, and immobility is enforced in school, the effects of which cannot be prevented in less than three periods a week of half an hour each in a gymnasium with a trained teacher. The crude methods which serve to rough-hew recruits can have no place in the delicate handling of the growing child of either sex.

The profile view shows that a necessary mechanical consequence of school life is to lessen the space available for breathing and to relax the tone of the abdominal muscles. This falls equally on boys and girls, reduces their vital capacity, and lowers their strength. The

consequences to girls may be even more serious than to boys. It is a waste of time to compile Government reports on the health of women workers, and handicap them economically on the grounds of physical inferiority, whilst the schools



3.—Diagrams of Circles.

of the nation set up a lower physical standard for girls than for boys. The present conventions of growth and education for girls are possibly responsible for a number of alterations in the relative position of the abdominal and pelvic

contents, for a great amount of weakness and impaired digestion, and for much of the difficulty in restoring the tone of the abdominal walls after childbirth. The artificial difference between physical education for boys and girls rests upon prejudice, and I believe that physical co-education would yield a more satisfactory result.

In studying the relation of mobility of chest to weight (in a school which provides adequate correction for the sitting position, and, in consequence, an approach to natural growth) there appears to be very little difference in flexibility between a child of six stone and one of nine or more. It is as though the size of the chest varied, while its mobility remained more or less constant. Since the flexibility of a chest bears a direct relation to vital capacity, this would be an additional reason against any factor in school life which tended to reduce it.

The "profile" changes are often more harmful to vitality than lateral curves, though these are very frequent. A spine bent as described will often become twisted. A child sitting with blackboard or teacher on his right will tend to twist round towards them: this could be avoided by regular changes of place in class. Unequal eye-strength, unequal length of leg, a habit of standing on one leg may cause such a twist. I know several well-marked curves due to violin-playing.

4.—Good Standing Position.

The Special Needs of Individuals.

So much for the healthy child. There are others who require special treatment. These are not confined to obvious cases of flat foot or curved spines, or the results of school accidents; they include individuals whose needs extend to what is usually regarded as the province of "mental" education. The three following cases show how the acquisition and correlation of experience may be hindered by a lack of proper physical development :—

Case 1. A boy of fifteen, very tall and heavily grown, at first sight a man, had much clumsy strength, and was capable of great exertion for a short time, followed by exhaustion. His efforts were exaggerated; he had little control of movements in which his limbs worked in different directions; he could do a "leap frog," but could not vault over a gate sideways. His rapid growth made both regular class exercise and individual treatment necessary so as to keep his chest flexible, strengthen his feet, and improve his co-ordination. In other subjects he could not spell or write well or quickly, and became despondent at being beaten by smaller boys. Constant failure would have reduced him to an awkward hobbledehoy, would have lowered his self-respect. Yet it would have been wrong to class him as a stupid and backward fool. His difficulties arose from

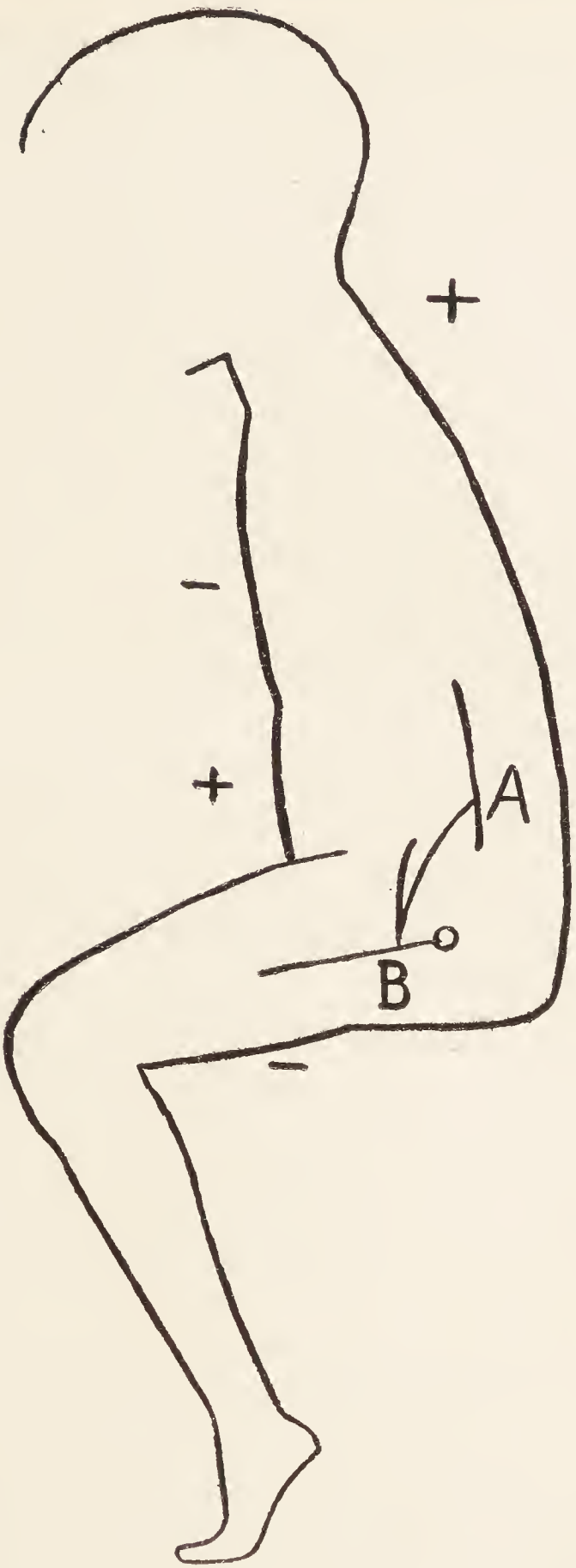
imperfect innervation. The need to write even a short sentence quickly aroused sensations of muscular activity, anxiety as to the result, and a whirlpool of self-distrust and discomfort which made him hopeless. Such a case, taken younger, can be helped enormously. So-called "physical" work must aim at co-ordination of muscular effort; so-called "mental" work must eliminate writing, except in simple forms, at the very outset. Essays on history must wait for a year or two, and compositions, with the necessary fine adjustment of fingers holding a pen, be replaced by mathematics or physics learned practically with rough apparatus, or by a course of woodwork leading up to metal-work and engineering. History, languages, and literature need not be neglected; they can be taken orally.

Case 2. Aged sixteen, thin, nervous, excitable, easily fatigued, mentally quick and alive. He has had pneumonia twice, and his chest was at first concave. His lack of application to mental work is due to physical fatigue. Towards half term he becomes tired, careless, forgetful, excitable, and —quite simply—poisoned with the products of fatigue. His particular temperament runs easily to a biting sarcasm, which causes him to be disliked by his fellows and insolent to his teachers. What he needs, and fortunately can get, is an occasional week-end's absolute rest in the school sanatorium, and regular periods of rest three times

a week. (I have seen him fall fast asleep in a deck-chair in the gymnasium—it is better to do it there than at the end of the term in an examination room.) He also gets class exercise three times a week and individual treatment for his chest.

Case 3. This boy is a specialist in botany and chemistry, rather nervous and shy, and over-exerts his arm to such an extent in holding a pen that his writing becomes worse than illegible. It has every appearance of gross carelessness, and as no examiner would bother to read it he is unlikely to get the scholarship to which his "mental" standard is easily suited. In addition to class exercise he has individual practice in writing with a pen which gives him a small electric shock when he grasps it with more than the necessary pressure. Incidentally he has been helped to correct his fault by some slight acquaintance with the muscular and nervous mechanism of the lower arm.

Without proper "physical development" both 1 and 2 might conceivably have joined that band of uncontrolled bodies which school masters and mistresses quite mistakenly regard as a necessary evil, the "shell," or, as some seem to think, the addled eggs of a school. I cannot see any reason to suppose that bodily changes at the stage of puberty need cause a total derangement of character. If and when we cease to keep physical and



5.—Muscular Changes in Sitting Position.

mental education in watertight compartments we shall be able to adapt both to individual needs and to eliminate completely the rowdy and uncontrolled and undesirable stage from school life. These things are signs of misdirected activity and misunderstood needs, and are due not to the faults of the children, but to the ignorance of the staff.

The province of physical development lies nearer to that of the teacher than of the doctor. There is no hard-and-fast line of separation, but the preventive work may be said to be done in the class gymnasium, the curative in the remedial gymnasium as well as in the clinic. What is more important than the question of who is to do the work is the amount of work to be done. In the schools of the well-to-do at least 25 per cent. of the children need some individual treatment; among poorer children the number will certainly not be less. The line of progress will tend towards schools where all members of the staff have a real working knowledge of the physical needs of growing children, a few have rather more specialized knowledge, and at least one has been trained for this work.

Physical Development as a School Subject.

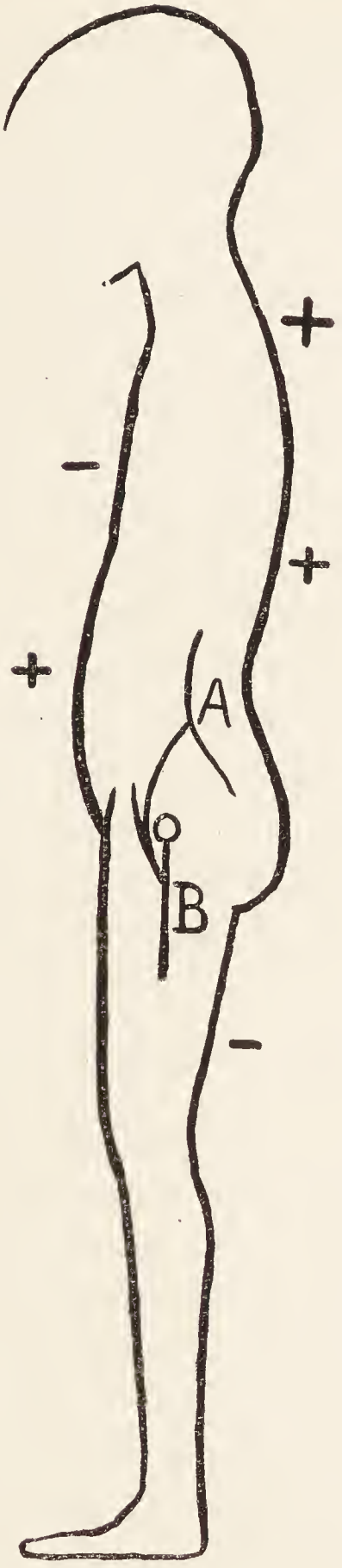
The best test of a system of education is the extent to which it can replace external authority by individual self-control, and since self-control

is impossible without self-knowledge, each school should aim at giving each child a working knowledge of the needs and processes of its body. On such knowledge depends respect of self and of others. The work of physical development thus includes of necessity both practice and theory; it can no longer be confined to the gymnasium, but will need a classroom in which some anatomy and physiology can be taught as a basis for simple lessons on the laws of health. Other school subjects, such as Nature Study, Botany, Chemistry, and Biology, can be co-ordinated and arranged so as to lead up to Physiology and Hygiene. The connecting link with the practical gymnastic lesson will be anatomy, which at some stage in school life should have a regular place in the curriculum. The average child has a profound interest in machines of any kind, and this is of infinite value if it can be applied to self-knowledge. I have found the weekly anatomy lesson marked by a greater general interest than any I have previously experienced during many years' teaching. A year's trial has convinced me of its value as a permanent part of physical education. Of course it must be elementary, as time is short, but much can be done by eliminating the writing of notes, and drawing them instead from blackboard sketches, from anatomical models, and from the skeleton.

Even a slight *résumé* of physical development

as a school subject must include two most important and vexed questions, discipline and sex education. It is customary to regard discipline as a thing to be learnt in the gymnasium and practised elsewhere throughout the school. Now it is no more possible to learn discipline than to learn attention. Discipline is in its essence self-control, and may be developed equally well in the classroom and the gymnasium. Since any class is always able to withhold discipline from a teacher, it is a thing which is in the class itself. The children pay in, as it were, a certain amount of self-control to the teacher, to be used during the lesson for the common good. Increased knowledge of self will tend to what is known as good discipline. A temporary result may be obtained by punishment, but corporal punishment becomes an absurdity as self-control improves. A reasoned system of physical development would remove this stupid survival of the Middle Ages from the schools, and a knowledge of the needs and processes of the body would, more perhaps than any one other thing, help to expose the appeal to force in its true colours as the blackest of superstitions.

Sex education or instruction will be found on examination to form an ordinary part of the theoretical side of physical education, and to occur quite naturally in the anatomy lesson, especially if this reaches a stage where simple dissection is



6.—Sitting Effects on Standing Position.

possible, and parallels are drawn between the animal and the human structure. Under these circumstances it is separated from its emotional side and is taught in class. The two evils of exaggeration and secrecy no longer exist. It need have no special place in the school time-table, but will have its proper proportion as part of a whole. No one can read the evidence before the Royal Commission on Venereal Diseases without realizing the appalling amount of ignorance which lies behind this problem. The hesitation and the varying counsels of those who were asked the value of school teaching shows how unprepared we are to deal with the matter. The whole evil is caused by ignorance, and these horrors could in a generation or two be removed by a system of education which really included the theory and practice of physical development.

The Present State of Physical Education.

At the beginning and end of each term each boy is examined, taking records of age, height, weight, and flexibility of chest. I then look at his feet. The level of his hips and the direction of his spine are noted from behind. He then turns sideways to give a profile view, then forwards for a view of his chest. These notes are charted, not written, as time is short: I can manage fifteen in an hour. As soon as the notes are finished they

are explained to the boy concerned, and directions are given as to how to improve. Cases needing special attention come again for a more detailed examination.

To deal with physical development properly we require that each child shall have a definite period of exercise each day, or at least three times a week ; that each child needing individual treatment shall have it ; that each child shall be given a working knowledge of the needs and processes of its body. This means a room in which the subject can be taught and a teacher who can teach it. No one would think of teaching chemistry without a laboratory. Why should a subject of at least as great value to the nation be starved out of existence? The cost would soon be repaid in increased health and better work. The following sentence occurs in the Syllabus of Physical Exercises for Schools issued by the Board of Education in 1909 : "For obvious reasons abdominal exercises proper cannot take a place among the ordinary routine exercises taught in elementary schools." That is to say, that the best means of correcting one of the worst consequences of the sitting position is regarded as beyond the reach of the Elementary School child. Those who know the total number of these children can estimate the amount of work there is to do before each child may hope for physical development. The size of the class will be limited by the number

of children whose movements can be watched by the eyes of the teacher. It is difficult to check the mistakes of more than twenty at a time, and these in games clothes where their bodies are not much concealed. The teacher must have knowledge of the subject, acquaintance with the growth of the body, and also have a general educational training. One hour a week during the whole period of training is not a reasonable amount of time in which to study human growth, even theoretically. It would not be enough to keep the students themselves in good health. This is not just a question of cramming an alternative subject. No hard-and-fast line can be drawn between "physical" and "mental" education, and ignorance of one cannot fail to affect the other.

The physical development of the school child is a legitimate and honourable branch of education, yet we expect to gain satisfactory results from all kinds of substitutes. There are Brigades of all kinds and all sects, there are Scouts and Guides, there are Cadet Corps and Officers' Training Corps, each of them with a definite end to serve, religious or military, and all of them promising something else in addition to physical development. But what is first needed is a real physical education, subject to educational laws, modelling itself to the needs of growth, in the hands of trained educators. Is it impossible? The near future will bring home the need of it.

You cannot grow healthy citizens in unhealthy surroundings. Vitality has an economic value. The children are there, waiting. The simple apparatus for dealing with numbers at a time is not expensive. Do not be deluded by the idea that apparatus is not necessary. It is the attempt to provide physical development without apparatus and with untrained teachers that has almost killed interest in the gymnastic lesson to-day. We spend millions a day on death. May we not ask for some of what is left to spend on life? Health is so easy to keep, so hard to get back again once it is lost. We have the children, we can afford the apparatus; how can we get the teachers?

The Future of Physical Education.

Most hopeful for the future is the situation of some of the modern universities in the centre of a vast population. Surrounded by many thousands of children, with a constant stream of the better output of the schools passing through their departments, they already possess the necessary organization for the training of teachers. They have practising schools; they can draw on the financial aid of the community in which they are placed for the organization of new subjects. It should not be difficult to co-ordinate the studies of candidates for a diploma in education so that

they could offer Physical Education as a special subject. Any such course of study should include either dissection or lectures from anatomical preparations; a slight theoretical acquaintance with surface anatomy is not sufficient. Surely it is reasonable to ask that teachers shall know the structure of the plants for whose growth they are responsible. All that is needed is the regrouping of studies so as to allow of fuller training in the subjects required, and the recognition of the course as being up to university standards by the granting of a diploma in Physical Education.

No branch of study will be more urgently needed in the immediate future, and none will produce more direct and lasting effects.

GENERAL PERSONAL HYGIENE

By JAMES WHEATLEY, M.D.,
County Medical Officer of Health, Shropshire

PERSONAL hygiene is such a wide subject that this lecture will be limited to the subjects of personal cleanliness, clothing, food and feeding, exercise and sleep. It is important to base the teaching of personal hygiene on sound physiology. School teachers especially should not accept dogmatic teaching, but endeavour to get a clear conception of physiological facts. The great public health measures of last century were devoted to the improvement of general sanitary conditions affecting the community as a whole. The result in the decrease of mortality and disease was remarkable. Personal hygiene was neglected by public authorities. The maintenance of a high rate of mortality amongst infants drew attention to the necessity for attending to the individual, and the institution of medical inspection of school children gave a great impetus to this work of personal hygiene. The child welfare scheme of the Local Government Board bridges over the period from birth to school age, so that now it

is possible to deal with many problems of personal hygiene up to the time of the child leaving school.

After leaving school one again loses touch with the individual, and at present there seems no likelihood of this grave defect in public health work being eliminated.

Cleanliness and Vermin.

Personal cleanliness forms a very important part of personal hygiene. From want of cleanliness, together with the close association of individuals, arise various verminous conditions. The vermin in this country are the different forms of lice, the flea, and the bug. The bug infests *the house*, and only wanders forth from the crevices in which it breeds to attack its victim. It is essentially a house infection, and can only be got rid of by thoroughly cleansing the house and destroying its breeding places.

The human flea (*pulex irritans*) lives on the blood of its host, but travels over the whole house, and needs strict household and personal cleanliness for its riddance.

There is also the insect which causes scabies, or itch. This insect burrows under the skin and causes intense irritation. Medical treatment is required for relief. Verminous conditions amongst school children refer chiefly to the head louse and the body louse (*ped. capitis* and *ped. corporis*).

There are slight differences between the two varieties, but these are of little consequence, as the creatures are recognized from the locality they live in.

The life history is important, as bearing upon the spread of the infection and the measures necessary for their extermination.

The eggs or nits of the head louse are laid on the hairs, and stuck firmly by a glutinous material. They are of an oval shape, slightly pointed at one end, blunt or truncated at the other. From the blunt end the louse emerges.

The eggs of the body lice are laid on the underclothing, principally along the seams next to the skin.

The eggs hatch in one to five weeks, according to temperature, and a complete cycle—i.e. from the time the egg is laid to the time that the resulting louse begins to lay—takes not less than three weeks.

For body lice and probably head lice also, the rate of laying eggs is about four to five a day for about four weeks, or roughly 100 to 150 for each female.

Various methods for freeing heads from lice are adopted by Education Authorities, consisting of measures for killing the lice, and loosening and removing the nits. A head cannot be considered clean until every nit has been removed.

Most of the substances used for killing lice

do not kill the nits, but experiments are now being made with substances (trichlorethylene) that appear to be very destructive of nits, and if their use is found to be practicable our difficulties will be much lessened.

School teachers can help in various directions to get rid of head lice, particularly by creating a pride in personal cleanliness, which will not tolerate such a condition.

By examination of the children at the beginning of each term, and re-examination of the verminous ones at frequent intervals, and by insisting upon treatment, the number of verminous children can be greatly reduced, but there remain a number of cases in which treatment of the home is required on account of the dirty conditions and infection of other members of the household. These are the cases for which the cleansing clauses of the Children Act are necessary.

Body lice are only possible where the clothing next to the skin is worn without washing for long periods. They are usually an indication of a dirty home. The remedy is a hot bath, clean underclothing, and boiling the infected clothes. If infected clothes cannot be boiled they should be stoved or steeped in petrol or benzene.

It is quite time that a strong public opinion should be formed on this question of verminous conditions. The Army is having practical experience of the ill effects of verminous conditions—

the enormous inconvenience and more than discomfort caused by body lice, and the large amount of incapacity from scabies on account of the necessary isolation.

Freedom from vermin is not only necessary for proper self-respect and education in its fullest sense, but also has important bearings upon health. A few years ago this was difficult to prove, but now typhus and relapsing fever are known to be spread by body lice, plague by fleas, malaria by mosquitoes, and many diseases almost certainly by house and stable flies. Head lice may cause eczematous conditions of the scalp and enlarged glands.

It is very clear that this work has not only an æsthetic and moral value, but is also important public health work.

Dirty and careless habits, besides producing vermin, are one of the causes of the spread of infectious disease, and particularly of typhoid fever and dysentery. These diseases are spread by the discharges from the bowels, and would be materially prevented if rules relating to washing of the hands after movement of the bowels were rigidly observed. It is particularly important that the hands should be clean before handling food.

Dysentery is almost always present in asylums, because it is impossible to teach the inmates to be reasonably clean.

Personal cleanliness, then, is not only desirable

for its own sake, but is a very important safeguard to the health of the individual.

Clothing.

The physiological necessity for clothing as contrasted with the æsthetic is to prevent the temperature of the body being unduly lowered. There is a second object, no doubt of great importance in tropical countries—viz. to protect the skin against the powerful rays of the sun.

In this country, however, the object of clothing is mainly to keep up the body temperature. This depends upon the amount of heat generated and the amount lost. In all warm-blooded animals there is a heat-regulating centre in the nervous system which maintains the temperature of the healthy body within fairly narrow limits. Hence a normal temperature is spoken of. In cold-blooded animals the body temperature tends to approach to the temperature of their surroundings. Notwithstanding this regulating mechanism, the temperature of the body even in health may be raised or lowered to a small extent under certain conditions. The factors that tend to raise the temperature are a hot and particularly a hot damp air, violent exercise, and excessive clothing. Those that tend to lower the temperature are cold, starvation, and lack of clothing. The raising or lowering of temperature to any

considerable degree above or below the normal is distinctly injurious.

It is evident that clothing should be more abundant if the air is cold, if the individual is underfed, and if he is leading a sedentary life.

It is evident, too, that excess of clothing is likely to be injurious mostly with a hot, moist atmosphere and during vigorous exercise.

The circulation of blood in the skin—varying enormously under different conditions—is one of the essential parts of the machinery which regulates the body temperature, and the delicacy of this machinery should not be damaged by injudicious clothing. When the temperature of the body is raised by exercise, by hot air, or in other ways, the skin is flooded with blood and a large amount of moisture is poured out in the form of sweat. Much heat is lost by conduction from the hot skin and by the *evaporation* of moisture, and the temperature of the body is kept within safe limits.

If, on the other hand, the body is exposed to cold, the blood-vessels contract, there is little secretion of sweat, and the amount of heat lost through the skin is in consequence lessened.

If from overclothing or other causes the skin does not perform this function satisfactorily, there will be undue rise or fall of the temperature of the body when exposed to heat or cold, with a corresponding injury to health.

It is extremely important that clothing, whilst giving the necessary protection against cold, should not interfere with this most important function of the skin.

The skin requires to be constantly stimulated in order to keep it in good condition, just as a muscle requires to be constantly exercised, and if by too much clothing the stimulus of cold air is entirely withdrawn, it loses its power of reacting and of protecting the body from the evils of undue exposure. This is one of the evils of overclothing. Another is that too much clothing, particularly during violent exercise, will bring about a rise of temperature of the body above the normal, a decrease of appetite, and a general lowering of health.

On the other hand, a person with too little clothing, particularly if associated with too little food and little exercise, will fail in cold weather to maintain his temperature at the proper level, and there will be a general lowering of health and considerable danger of contraction of disease. Such a condition exists in underclothed and underfed school children, particularly if seated for an hour or two without exercise in insufficiently heated rooms. If schoolrooms are at any time much underheated, the children should be allowed to exercise at short intervals.

When taking vigorous exercise, a well-fed, healthy person is rarely under-clothed; at such

times the amount of clothing required is not great, and the value of the exercise depends largely upon the person not being overclothed. The full value of vigorous exercise cannot be obtained unless the clothing is reduced to the smallest amount compatible with the proper maintenance of temperature. In many of our badly heated schools it would be a great advantage if the children carried their coats to the school and put them on when they got there, instead of doing the opposite. This applies particularly to the first half of the morning session, when the temperature of the school is generally at its lowest.

In order to get an effective clothing one has to select a material that is not a good conductor of heat. Of the two materials of which clothing is made, wool is a poor conductor, and cotton is a good conductor, of heat. The inferiority of cotton as clothing is in this respect got over to some extent by weaving it in a cellular form, so that much air is entangled between its fibres. This method of weaving increases the value of cotton clothing. Another important difference in the value of the two substances is due to the fact that cotton is absorbent and becomes wet and clammy in the presence of moisture, whereas wool is only slightly absorbent and remains comparatively dry, the moisture from the skin evaporating through it. There is probably more risk of a

chill after vigorous exercise with cotton than with woollen clothing. It is, however, contended by some that cotton underclothing maintains the tone of the skin better than woollen.

It is most important that clothes should not restrict movements. Tightness around the neck, chest, or waist is particularly injurious.

According to Professor Leonard Hill, a large amount of benefit from open-air treatment, and open-air life generally, is due to constant stimulation of the skin from movement of air. In this way the system is braced, heat is abstracted, the appetite is increased, and the general metabolism of the body proceeds at a greater pace. The benefit of this treatment is lessened by overclothing. It is the usual experience of persons living an open-air life that they very soon are able to do with less clothing. This is due, partly at least, to an improvement in the reaction of the skin.

Food and Eating.

One of the most important, if not the most important, matters in personal hygiene is food and the way it is eaten. If the food is insufficient or very unsuitable, attention to other laws of health will produce little satisfaction.

Insufficient food is largely an economic question, but in a considerable number of cases it is due to a lack of knowledge of food values,

or food preparation, or unwillingness to purchase cheap forms of food, as margarine instead of butter, or the cheaper nitrogenous vegetable foods instead of the expensive animal foods. These are matters that can only gradually be remedied by education.

On the much-debated question of vegetarianism *versus* a mixed animal and vegetable diet, I would simply say that, although many persons take far too much meat, a mixed diet is probably best suited to the majority of the inhabitants of these islands, living under present conditions. Persons living a hard outdoor life can generally assimilate and flourish on a purely vegetable diet perfectly well, but such a diet does not suit a considerable proportion of persons living an ordinary town life.

Recent investigations have shown that a considerable proportion of the proteids of many of the common vegetable foods are not available for body-building, and the estimates of the value of these foods has had to be revised.

Apart from the value of food eaten, there are many important matters that are worth very careful consideration.

The length of intervals between meals or, what is much the same thing, the number of meals a day is one. Some persons live comfortably on one meal a day and others on two, whilst most people have four or five meals, and some even

six. There is a wide divergence, and at each extreme one can point to persons apparently enjoying good health. We naturally inquire whether there are any known physiological facts that will help as a guide. The length of time that various foods require for digestion in the stomach have been carefully worked out, but I am not aware of any facts bearing upon the interval that should elapse between the emptying of the stomach and the taking of food. That there should be a considerable interval is very probable. The length of time required for the digestion of a meal depends upon the kind of food and the quantity, but it may be taken as a rough general rule that an average meal takes three and a half to four hours to digest and to be passed through the stomach. Allowing a rest for the stomach of an hour to an hour and a half, we get an interval of five hours between meals, and this is equivalent to three meals a day. It is probably safe to assume that three meals a day approaches the physiological ideal. Frequent meals and eating between meals are undoubtedly a common source of digestive troubles, by introducing food into the stomach at a time when food previously taken is partly digested.

It is a mistake to suppose that the nutrition of a healthy individual is improved by frequent feeding. Such a practice prevents the develop-

ment of a good appetite, and must interfere with the efficient utilization of the food.

An equally important question is, When should liquids be taken?

I believe, for many reasons, that children should be brought up never to drink at mealtimes. If a person does not drink at mealtimes, he must masticate his food properly, and the resulting benefit from better developed jaws, better preserved teeth, and better digestion is very great. Good mastication of food without drink causes a good flow of saliva—a most important matter for the cleansing of the mouth and teeth and for the digestion of the food. There is a third point of undoubted importance in persons of weak digestion—viz., that there is no dilution of the gastric juice by large quantities of fluid.

As regards school children, a good plan is to encourage them to drink freely at the morning and afternoon playtimes. These appear to be well timed for drinking, having regard to the times for meals.

A concise rule of importance and capable of general application is "drink *only* between meals, and never eat between meals."

The eating of sweets between meals is one of the commonest and most injurious of our food habits. It is not sufficiently realized that sugar is a most concentrated food, and in this respect

is very unlike fruit, which, consisting mostly of water, can perhaps be eaten between meals with comparative impunity.

As a means of inculcating good habits of eating amongst school children, I have for years advocated that a teacher should always be present at the midday meal, and that he should take this opportunity of teaching and training the children.

Exercise.

Exercise is a very important factor in health. It brings about an increased metabolism in the body—that is, it causes a greater burning up of food and creates a bigger appetite and increased vigour and growth of the part used. In this way it probably produces, unless it is carried too far, a greater resistance to many diseases—in particular to tuberculosis. It follows that good results from exercise cannot be expected in the underfed. In these cases much exercise probably does harm. The principal object of exercise should be to produce an all-round development of the body—a vigorous heart, an expansile chest, the proper function of the organs, including the skin, an erect attitude, a free-and-easy carriage, a symmetrical muscular development, and an alert and well-balanced nervous system.

Another object of these exercises is the remedying of deformities or bad habits.

Exercises directed specially to the prevention of mouth-breathing should have great attention. If the mouth-breathing is due to obstruction, medical attention is necessary in the first instance, but it is frequently a habit that can be corrected. It is a dangerous habit, for it allows air to pass the throat and enter the lungs without being filtered and moistened in the nose. The moist mucous membrane of the nose is a great protection, and this protection is entirely lost when a person breathes through the mouth.

The exercise of the jaws in mastication is another exercise which is almost universally neglected, with, I believe, disastrous results. This exercise should take place at mealtimes on appropriate food.

There are certain conditions that should be observed if physical exercises are to give their full value: they should take place *daily*, in fresh air, not in dusty or stuffy rooms, and the person should not be overclothed or wear tight clothing, particularly around the neck, chest, or waist.

The dangers of violent exercise for a feeble or diseased child have always to be borne in mind by a teacher. Undue breathlessness, or fatigue, or pallor after exercise are reasons for referring the child for medical advice.

I look forward to a great improvement of the physique of the people from efficient physical exercises in our schools. The first essential, how-

ever, is the proper training of the teachers, and for this purpose more thorough and energetic measures are desirable.

Sleep.

Sleep is the great reviver of the body and mind. At no other time is rest complete. It is necessary that it should be sound and unbroken—a condition that can only be obtained with difficulty in many of the houses of the working classes. The amount of sleep required varies with the individual and with the occupation during the day.

No doubt the best rule for a normal individual, properly trained, is to sleep until waking, and then to get up at once; but this is not often practicable under present everyday conditions. Generally speaking, a child of five needs about twelve hours' sleep, at nine about ten hours, and an adult about eight hours. If the sleep is very disturbed, it may be due to overwork at school, or work the last thing at night, or to defective eyesight or obstruction of nose and throat or other physical causes. The cause should be sought for, as it is impossible for the child to develop satisfactorily without good sound sleep.

I have come across several marked instances of disturbed sleep with night terrors in children with eye defects that have disappeared when the vision has been rectified with glasses.

Perhaps the most important matter that affects a child's sleep is the way in which the last hour before bedtime is spent. During this hour no food should be taken, and there should be no hard mental or violent physical exercise or excitement. If these extremes are avoided, occupation of the mind and body are good.

In the children of our elementary schools insufficient sleep arises from the children being worked at night on money-making occupations, or from carelessness of the parents, or from difficulties inherent in a large household. The school teacher can often do something to bring about an improvement.

In older children lack of sleep is often due to mental strain in cramming for examinations. In such cases, whatever may be the result of the work as measured by examinations passed, there can be no doubt that the result to the individual is bad.

The importance of this matter as regards children is not only due to the immediate effect on the body and mind, but also to the fact that good or bad habits are formed which are likely to last throughout life.

ON THE CARE OF THE EYES

By JAMES KERR, M.A., M.D.

If properly regarded vision influences all school work, and sometimes, unfortunately, is also influenced by school work.

On entering a classroom often the first order heard is "Sit up." This expresses exactly the chief requirement of education in regard to vision. The need is that children shall sit up, with their eyes well away from their work.

In the case of a young child the brain is not yet ready to interpret correctly all that the eye sees. There is a kind of mind blindness from want of development. Very young children do not see badly, although they often fail to interpret, and when tested in the usual way give poor results, which can be much improved by the additional stimulus of giving them a sweet for every extra line of the test type which they manage.

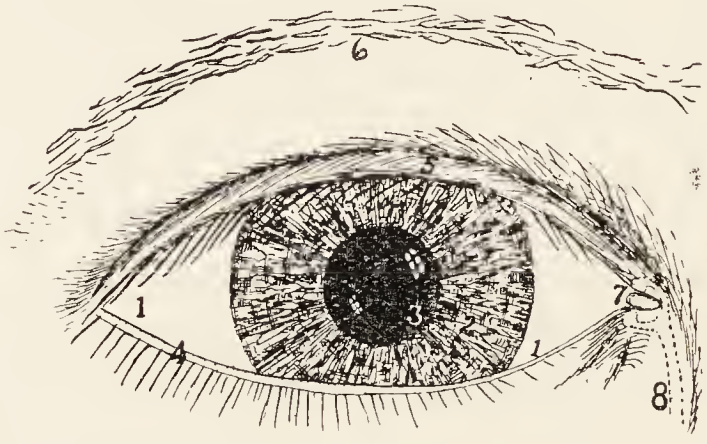
Further, these children store up the pictures which they see. One of Olive Schreiner's books describes a first-remembered picture of infancy, of being held up on a bright spring day to look

over fencing boards at the little sucking pigs in their sty, running about glistening white in the sunshine. This record impressed me, as it nearly coincided with a similar memory cameo of my own. In addition to these brightly and vividly illuminated flashes of early life which are remembered are a vast number which disappear into subconsciousness to influence the later development of the mind. The child in this respect is almost passive in early years, receiving impressions, building them into the structure of the mind without appreciating what they mean, and later on the effect thus unconsciously absorbed possibly constitutes or influences the foundations of character. Hence the importance in the infant school of cleanliness, brightness, and colour. Even the dress, neatness of hair, quietness, and restrained manner of those working in the school may in early years be more effective finally than the subjects actually taught. This, indeed, helps to constitute the *tone* which is so valued in educational life. So even in this sense vision has very much to do with education.

The eye or vision cases in connection with Care work among children will present terms and names on their cards or records which possibly do not at first convey much information.

Here are a couple of figures which show the anatomical structure of the external eye. For the sake of clearness in the section the eyelids are

represented as somewhat separated from the eyeball, and the conjunctival sac looks like a wide opening, although in reality it is only potentially a sac, the lids for practical purposes being in contact with the eyeball. The white part seen in the eye is the firm sclerotic coat. It is covered by a fine membrane, the *conjunctiva*, a reflection of which also covers the inner surfaces of the lids,



EXTERNAL VIEW OF THE RIGHT EYE.

(1) On the conjunctiva covering the sclerotic; (2) on cornea above iris; (3) above pupil; (4) edge of lower lid, with cilia on outer edge and meibomian gland openings on inner; (5) upper lid; (6) eyebrow; (7) the caruncle with the openings above and below it of (8) the tearduct to nose.

enclosing the potential space referred to between the lids and globe, the *conjunctival sac*. This sac is in communication with the nasal cavity through the nasal or *tear duct*. Inflammation of the membrane is referred to as *conjunctivitis*, sore eyes, commonly due to slight catarrh of the surface.

When children have adenoids or enlarged tonsils catarrh of the nasal spaces is very com-

mon, and often involves the tear ducts, and through them the conjunctiva. Sometimes slight catarrhal changes about the edges of the lids leads to crusting and thickening, known as *blepharitis*. The bulk of cases are called "blight." These conditions are practically due to debility, and the best treatment is prevention by stimulating the nutrition of weakly children through exercise, fresh air, washing, and good feeding.

Another occasional happening is *acute conjunctivitis*, due to micro-organisms. This often occurs in outbreaks, sometimes called "pink eye," mostly spread in school through the towels. It sometimes infects a whole household in which the child lives.

A more serious condition, of which the results only are seen in school children, is the acute conjunctivitis known as *ophthalmia neonatorum*, ophthalmia of the newborn, arising from infection of the eyes at birth. When a newborn infant's eyes become red or stick together, unless attended to within a very few hours good vision or even sight may be permanently lost. A dozen years ago two-fifths of the blind children had this assigned as the cause of blindness. The disease has now been made a notifiable infectious disease, and in the next ten years there may consequently be expected a very notable decrease in blindness.

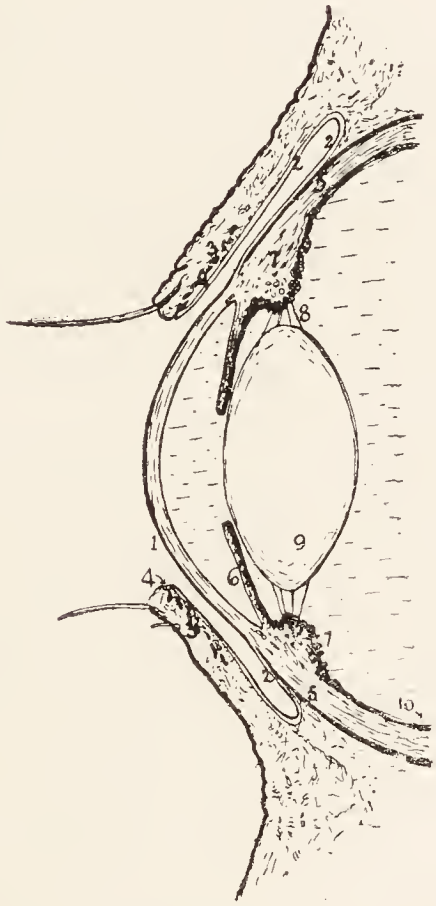
Another condition rarely seen in London, and then chiefly among aliens, is *trachoma*, a very chronic and destructive conjunctivitis, common all over the East and in Russia. When cases are found they have to be watched carefully, especially in relation to residential schools.

Along the outer edge of the eyelids the eyelashes grow, and under the inner edge are a series of small sebaceous glands, the meibomian glands, which serve to lubricate the edges of the lids. Sometimes the ever-present germs infect one of these glands. If the child happens to be in reduced health the gland becomes inflamed, and the tissues around get swollen, red, and painful. This is commonly known as a stye. The eyes should be bathed frequently with warm boracic lotion until the stye gets better, which it generally does after discharging a little matter. Trivial in itself, yet in debilitated children styes may occur one after another, becoming indications of serious want of vitality, and local treatment is then insufficient ; constitutional treatment by good feeding, and a convalescent home, preferably at the seaside, is needed.

One of the best ways of stimulating and developing a child is by daily fresh milk, not boiled or sterilized. The risk of germs has to be run, for there is in the fat of milk a *vitamine*, a peculiar substance which chemists cannot isolate. It is existent in minute quantities and stimulates

growth and nutrition in a remarkable manner. A cup of fresh milk regularly in the middle of the forenoon often will have an extraordinary effect on a debilitated child, who at times seems almost revitalized by such treatment.

In front of the eye is the transparent part,



DIAGRAMMATIC SECTION THROUGH FRONT OF AN EYE TO SHOW

(1) Cornea ; (2) conjunctiva ; (3) eyelids with (4) meibomian glands ; (5) sclerotic ; (6) iris ; (7) ciliary body and muscles ; (8) suspensory ligaments ; (9) lens in its capsule ; (10) retina.

the *cornea*, through which the rays of light travel into the eye ; it is of quite hard, horny consistence and built up of flattened cells in nearly parallel layers. Sometimes from disease these

cells have material effused between them, and a little haziness appears in the cornea. This is known as *keratitis*. On the surface it may be due to mere catarrh, but deeper in the cornea *interstitial keratitis* occurs from inherited disease, which also requires long and careful constitutional treatment. It may come on in later school days, and if neglected lead to great and permanent impairment of vision.

No one but a doctor should ever venture, however, to ascribe any symptom in a child to inherited disease. Marked symptoms of this kind are very rare indeed in school children, and yet cases have occurred where sad mistakes have been made, and indeed gross libels stated about children or their parents by ascribing illnesses to specific diseases when they have really nothing to do with them.

Looking at the dark centre of the eye, this is the pupil; behind it is the transparent lens surface, and radiating around it are the coloured fibres that make up the iris, and to which the colours—blue, grey, or brown—of the eye is due. The iris is rarely subject to inflammation, *iritis*, which begins by a muddy and indistinct appearance of the iris fibres. Even slight inflammation may cause parts of the free edge of the iris to adhere to the lens surface and become fixed there. If a child has a little pain in the eye and some irregularity of the pupil, it wants

attendance in a few hours, or the eye may become seriously affected and damaged. Any of these diseases of the interior of the eye are to be considered urgent and damaging.

A much commoner occurrence is ulceration, especially of the cornea. Corneal ulcers may easily form from attacks of germs in poorly resisting children of the debilitated type, or after exhausting diseases like measles or influenza, and they heal very slowly in such children, often leaving little opaque scars, which anywhere else would be of no importance, but here may be right in the centre of the cornea and damaging to vision.

Dust and bits of grit from the road are full of germs, and in the dusty months of the year, and at the two extremes of life, the babe in arms and the old grandparent, they easily set up septic ulcers, which occasionally are not taken in time, so that the eye is lost.

These cases show how necessary it is to develop the powers of immunity in young children by preventing debility by every means possible. In old age where vitality is waning little can done. Life is a continuous struggle against germs. Through early infancy and even school days immunity is usually slowly gained ; it is part of the natural education ; so that the struggle is less severe during adult life, until the weakness from length of days again overtakes us,

Another common form in the outpatient room is eye trouble due to little *phlyctenulæ*, papules on the exposed surface of the eyeball, which form and may ulcerate and be very painful. They often cause intolerance of light, and are another sign of debility and ill-nutrition. This *phlyctenular keratitis* is usually very chronic, and calls for cod-liver oil, and the convalescent home in a bracing district.

Injuries are very serious to the eye. The commonest, perhaps, is when a child wants to untie a knot in a bootlace, takes a fork, and putting his head down to see better, the fork slips and runs into his eye. The eye is usually lost, especially if the wound is within a couple of millimetres of the corneal margin. A seriously injured eye should at once be removed to prevent the risk of total blindness from the other one being affected by *sympathetic ophthalmia*. These operations are often refused by relatives until it is too late to prevent the bad results of sympathetic inflammation.

Sharp-pointed scissors are another source of frequent injury to the eyes of young children. Even the scratching of a mother's eye by the nails of a suckling may result in painful injury. Sometimes some blepharitis, slight conjunctivitis, wateriness, or heaviness about the eyes is kept up by eye-strain, especially in long-sighted children, who see well, and who, having clear

vision under strain, are missed in the usual school tests. In the present war among the numerous eye injuries, owing to immediate and necessary treatment being carried out, there has as yet not been a single case of blindness due to this sympathetic ophthalmia.

The eyeball itself consists of the retina, a sensitive, nervous sheet, which is an outgrowth from the brain, and remains in connection with it through the optic nerve, and of other structures which serve to form a clear picture of surrounding objects on the retinal surface.

With a normal eye the rays of light from all objects over, say, 20 feet away are practically parallel when they reach the eye, and they are then exactly focused by the corneal and lens surfaces to form a clear image on the retina.

A pocket camera will focus clearly all objects more than 20 feet away, but if a picture of a nearer object is wanted, it is necessary to use an adaptor, a small lens put on in front, to bend the rays of light to be parallel, when the camera lens focuses them correctly.

A similar effect is attained in the eye by a special mechanism. The fine ciliary muscles relax the tension of the fibres which hold the lens capsule tight, and then the elastic lens springs out and becomes rounder, producing a greater bending effect on the rays of light and focusing them on the retina. This muscular effort and

its results is known as accommodation. As old age comes on the lens loses elasticity, and its owner cannot accommodate for near things, so that the adaptor method of the camera has to be used in the form of reading glasses in front of the eye.

The young child has a relatively short axis to its eye, which has not yet grown to full length, so that even for distant things it has to exert some accommodation, and to see near things it has this accommodation to exert over and above the amount an adult would have to exert owing to the proximity of the objects. A child, therefore, has to make a much greater effort to see near things than an adult.

Anything nearer than 10 inches requires such an excess of effort of accommodation that vision at this distance is neither economically or physiologically good, and the eye becomes overworked to an amount, especially in children, which is excessive. The excessive work and tension causes the posterior wall of the eyeball to gradually stretch. When this stretching is so great that the eye cannot focus a distant object to a clear image on the retina, the condition is known as *myopia*.

The chief age for this first appearing is between ten and fifteen. It usually increases with eye-work during the growing period, so the secondary school age is the worst for the development or increase of shortsightedness. After twenty-five the

tendency to stretching diminishes, unless serious damage and thinning of the coats has already occurred.

When children have to look at things close to them they have also to work hard with the muscles which converge the eyeballs, and from long-established usage a certain relation has been set up between the amount of converging and the amount of accommodation. When looking at near things, owing to shortness of its eyeball the child exerts a great deal more accommodation than convergence. The result is that the eyes over-converge to keep up with the amount of accommodation, and an inward squint occurs. In young children doing near work many will be observed to squint. Some of them have a tendency to cease use of the squinting eye, and children are found later in life who can, perhaps, only count fingers with one eye, whilst they have good vision with the other. This failure in the poorer eye is called *amblyopia*. There may be nothing to account for it in the state of the eye, but there will usually be a history of squinting with it in early life.

The small muscles which control the eye movements have relatively a much bigger area of brain controlling them than, say, the thigh muscles. Every one knows how easily the eyes set up nerve-strain and headaches. Many people get nausea if sitting in a railway train facing the engine from

the unwonted eye movements ; the academy headache from continued raising of the eyes is notorious ; the strong cyclist, too, who scorches ahead with almost horizontal back and head, with eyes raised to look forwards, is very liable to headache. Another notorious case is the continued raising of the eyes to watch the screen if too near at a kinema show, now one of the commonest causes of children's headaches.

On account of the strain to the eyes infants should not do fine work. Another reason is that they are also unfit to stand the strain of fine finger movements. Not only for eyes, but also for fingers and nerve-strain, is it demanded that pens, pencils, papers, needles, and sewing shall all be kept out of the infant school. Big objects and well-lighted rooms help the children to form large images on the retina, which then sends up a voluminous nerve message from the nerve cells of a big area on which the image is formed to the brain, so that the child can learn easily without straining.

A child with a curved back can be straightened up ; even flat feet can be restored by exercises, but an eyeball which is overstretched knows no improvement. Change is likely only to be change for the worse. Many children who are not caught earlier are detected as myopes when they come up for examination for scholarships. Yet for a child of eleven with marked myopia

to be allowed to go on with literary work is no kindness. The place for that child is the myope school, with its eye-saving tasks. Such a child wants strengthening-up in fibre in every possible way. Myopia is always serious, and the more serious the younger it is met with. Any child in an elementary school with marked myopia, unless the myopia can be retarded, is in a very dangerous condition as regards vision in later years. This was well impressed on me when beginning school work by the case of a clever girl in training for a teacher; she had a considerable degree of myopia, and had distinguished herself in her studies, but was compelled to discontinue preparation as a teacher. An educationist found clerical work for her in a large office, where, against advice, she went. A few months later she had hæmorrhage and detachment of the retina with loss of clear vision in one eye, followed in some weeks by the same conditions in the other eye. Being now practically blinded for all except coarse objects, she had to discontinue work. Some years after she was reported as having become careless, indifferent, and mentally altered from the impairment of vision. If she had been kept from near work in her growing period and avoided such things as typing and shorthand until twenty-five, she might have then gone on for years not much worse.

There is an enormous amount of prescribing

of glasses for children. The man who detects visual defect is not the one who measures the child or fits it with glasses, and probably a good many children now are wearing glasses who do not need them. Formerly glasses were very costly, but the society started in London by Miss Susan Lawrence altered all that, so that glasses now can be obtained quite inexpensively. The fitting, however, should only be done after careful consideration by doctors who know both school and hospital circumstances. Opticians should never prescribe glasses for children. Many children get their eyes overworked, get spasm of the accommodation muscles, and appear short-sighted, when they are not shortsighted, but only want rest for their eyes for a time. Other children would be better for glasses who pass all the school tests unnoticed.

The school work should be accommodated to the child instead of the child being fitted to the work. Much eyework in school is exerted on unnecessary tasks, especially homework, done often under bad conditions of lighting, and thereby accentuating any possible eye-strain. The eyes and their condition are very delicate indicators of health, and in those cases of debility which are so common in town children, and so common among children with eye defects, the child chiefly requires a hygienic environment, exercise, fresh air, good food, and a minimum of near eyework

in stooping positions. Securing these conditions, it might be hoped to diminish materially the ten per cent. with bad vision found in elementary schools at the present time. So far as Care Committee workers are concerned the chief thing is to prevent these debilitated conditions of young children, and when, in spite of these efforts, eye troubles arise, many of the cases are urgent, time is of the greatest moment, and the eye must be treated in hours rather than days if treatment through the school is not to become a danger rather than a help.

THE MENTAL HYGIENE OF THE CHILD

By F. C. SHRUBSALL, M.D., F.R.C.P.

During the educational period of life it is necessary to develop the powers of perception, ideation, and conception, to progress from the primitive-feeling tone to the complex emotions and from the simple instinctive reactions to the innumerable voluntary decisions of our daily life. Above all it is advisable to cultivate a power of inhibition and of adaptation to surroundings without conscious or subconscious strain, which will prove a solid basis for character. The favourite key to the comprehension of the unfolding of the mental processes lies in the view that while the terminal variations of intellect or character are largely the results of individual experience, the main features of the nervous system and the chief innate tendencies to action are determined by inheritance. The oldest elements of the nervous system are concerned with fundamental movements, such as the beating of the heart, which are automatic in action, as a rule unattended by consciousness and but little susceptible of education. These elements in large measure come

to functional activity before birth. They are followed by a further series, which on the motor side directly control the skeletal muscles and on the sensory side are concerned with the simpler sensations of taste, scent, tone, form, and colour. Their functioning results in such co-ordinated activities as standing, walking, and running, which are attended by consciousness and need willed attention in their earlier stages, but once mature continue automatically and subconsciously. From the standpoint of the nervous system the earlier all-balance movements—walking, cycling, skating, walking on planks, etc.—are acquired the easier they are, and the greater is the proficiency attained. It must, however, be remembered that in the earlier stages all the muscular movements of children should be of a broad, sweeping character, involving the larger joints, and that fine movements of hands and fingers should not be attempted until later date.

The highest levels of the nervous system, which inhibit and control the lower levels, consist of centres, some of which are concerned with all kinds of associations of sensation and movement, while others have the still higher function of co-ordinating these associations and constituting the structural bases of voluntary action. Certain lines of response to nervous stimuli become organized and automatic in each of the levels, resulting in the acquirement of aptitudes, such as

cycling or writing, on the one hand, or to those fixed reactions to mental or moral stimuli, which are known as habits, on the other. These, though somewhat later in their appearance, may become quite as automatic and invariable as the response to physical stimuli, but being the youngest acquisitions are the first to go in the presence of any disturbing influences, whether toxin, disease, or injury. Physical control, the power of balancing and the like, is rendered the more easy by the invariable quality of the response to any failure ; the feeling of displeasure, if not of actual pain, which accompanies this standing in marked contrast to the pleasure of success. The training of habits must be commenced with the first demands of the infant and continued throughout the educative period. The process has at first to be mechanical and dogmatic, since the intellect is insufficiently developed to appreciate reasons ; yet if persevered in unswervingly, even those actions which are at first distasteful may be rendered so far habitual as to become neutral, if not even slightly pleasurable in affective tone. Rules of conduct for the young must, however, be absolute, since any deviation or relaxation undoes the accumulated impression of months by allowing alternative motor associations to be created and alternative channels for nervous response to organize.

Each brain centre has a nascent period, indi-

cated by somewhat uncontrolled spontaneous activities, such, for example, as babbling in the case of the motor speech centre ; a period of plasticity during which education is possible and control is attained ; during this period in the case of speech centres, language or languages are acquired ; a period of maturity gradually passing into decay. During the course of development some centres acquire a relative predominance ; this is well illustrated by a study of the speech centres. Language is the representation and means of communication of thought. By the constant connection of a particular sound with a particular experience an association is set up, and the child comes to understand spoken words before he can himself speak. The earlier words are associated with definite sense impressions, and abstract words long remain meaningless. During the early part of the second year of life babbling accompanies an understanding of many sounds, but the child does not employ speech as a medium of communication until he has definite ideas to express. Gradually, in the second or third years of life, an organic connection is elaborated between the motor speech centre and the dominant word-hearing centre, and between the latter and the higher centres which subserve ideation and volition, and the child begins to speak.

At a later period in the history of the human race language was also developed as pictorial

representation, which by a process of simplification evolved into writing, while in the human brain visual word centres and motor writing centres developed with their corresponding association areas. These being racially far younger are more variable, so that a failure to read implies much less mental defect than is involved in a failure to understand spoken language, while in the absence of special training deafness from early life leads to more serious failure of mental powers than does blindness. Language, whether spoken or written, is in its early phases an expression of concrete ideas, and the association centres are organized with the word whole, as the basis. In the course of development some centres assume a relative predominance, and so the mental type of individuals comes to vary, some being visuals, some auditives, and others motor. These types are apparently congenital and hereditary.

Plastic cells are very liable to injury by adverse influences, and are readily affected by the products of their own action if these are not quickly removed. This shows itself by fatigue. The fatigue products are removed by the lymph and blood circulation, which has to be encouraged by muscular movements ; hence the value to infants of short rests alternating with sharp bursts of activity. Lessons for young children must always be of brief duration, since the attention cannot be held continuously to any topic. Short intervals

of educational stress should be placed between longer periods in which the functioning cells are more mature, and whose activity produces more pleasurable sensations. It is harmful to keep a young child sitting still more than a quarter of an hour. Repair is effected during sleep, of which a longer period is needed the younger and the more rapidly growing the child.

During the junior school age sensory education should be completed, accessory movements should be trained, reading and writing developed, and as many useful habits as possible rendered automatic. Associations rapidly increase in number and complexity.

From this time onwards associations of higher orders come into being. It is also necessary that the personal hygiene and health of the child should have been considered throughout, ample and suitable food supplied, with adequate sleep under good conditions, unbroken by disturbance of elders retiring to rest at very different hours, or irregular owing to attempting to carry out impossible homework or commencing the task at too late an hour. Homework under the conditions of the home has to be seriously considered in some instances, for the strain thus arising may have far-reaching effects.

With the advent of adolescence emotional control has to be encouraged in such a way that the instincts of the individual are subordinated

to the common rule, with as little conflict as possible, open or subconscious. Some children can only be described as unemotional ; they form a placid backbone for the nation, never worried or disturbed ; they are great players of games for which they would cheerfully abandon any schoolwork, regardless of any pains or penalties ; indeed, the only punishment they resent (and justly) is detention on a fine day. Immediate corporal punishment, after Nature's model, appeals to their sense of the fitness of things. Such children cannot be overworked in school or by homework, for when other interests came to the front the homework would be hurried appropriately. They cannot be strained, for they leave work and worry behind them at the school gates and are content largely to live in the present. Such children in later life are responsible for the dogged carrying-out, but not for the initiation or direction of almost all movements.

The emotional type has been said to fall into two main divisions, the unrestrained and the restrained. The unrestrained emotional type forms the volatile enthusiasts, excelling in the arts, quick to learn, if unstable in memory. The type is rarely mediocre, but is either in many respects brilliant or definitely defective. Such children can be easily strained, but as they show the strain readily and are loud in their protestations, the process is not likely to be pushed, and they rarely

suffer. The restrained emotional type, on the other hand, may suffer in silence, and is often the subject of conflicts between the emotional content of their mind and their powers of inhibition. The suppressions which result are now believed to be the bases of many psychoses or functional nervous disorders. Such children may have a brilliant early career, but through misunderstanding or the lack of proper supervision be wrecked even in early school life by the application of too grievous burdens.

Much work, particularly if conducted under bad conditions, and with the accompaniment of worry as to results, may lead not only to nervous breakdowns, but to definite physical ailments, such as Graves's disease (exophthalmic goitre). These conditions are far from uncommon among those working hard for examinations under unfavourable conditions, with perhaps much travelling and home study. Women suffer more than men perhaps, because they worry more in advance as to the results and allow themselves less physical exercise, which is not only a much-needed relaxation, but an essential aid to the free circulation required, if fatigue and nervous exhaustion is to be avoided.

The problem assumes some urgency at an early age in relation to the giving of scholarships at secondary schools to children attending ordinary elementary schools. To derive proper benefit from a secondary education the pupil should be

able to live up to the standard of the school, to be well nourished, have good hours of sleep and sufficient opportunities for quiet or privacy in the home to allow of study and the preparation of home lessons. If these are not attainable the child, especially if a girl, is likely to worry, and probably adds a physical to a mental and social strain, so that her health will suffer. Where suitable arrangements cannot be made it would often be better for the child not to receive a scholarship, for a maintenance grant does not get over all difficulties. Housework, too, is demanded of the elder girl, which would not be asked of the boy, nor given were it asked ; often in addition is practising and out-of-school music or other lessons and the amount of home lessons set. Pressure on the parents should make them realize the possibilities of overwork and worry. For worry all that can be done is to point out to the school mistresses that they shoulder a heavy burden of responsibility in regard to the prevalence of breakdowns and nervous disorders among the adolescent and young adult women of the country.

Emotional trouble is more commonly found in precocious children, who perhaps balance rapid development in some directions by weakness in others. They are often members of families of the neurotic type, with a lack of inhibitive control. Minor grades of nervous exhaustion are common ;

the chief symptoms are increased irritability, a rapid onset of fatigue, and deficient emotional control. Children suffering from this condition may be listless and tired throughout the day, though they more often start brightly but rapidly deteriorate. They are easily affected by bright lights or loud sounds, are intolerant of even moderate degrees of heat and cold, whilst apparently hypersensitive and afraid of painful stimuli of all kinds. Motor irritability shows itself in involuntary movements ranging from fidgets to definite tics or habit spasms. On slight provocation such children become excited, with tense muscles, quivering lips, and talk in jerky, high-pitched tones. Stuttering is not uncommon, while laughter, tears, or passionate anger are easily elicited. Withal, there is often a desire for sympathy, great sensitiveness to criticism, morbid fears, and unfounded apprehensions.

Overwork, worry, late hours, all tend towards an anæmia which will aggravate the nervous condition. There is for a time a tendency to go to extremes. Dawning sex-consciousness may express itself merely in dress, in idealization of members of the opposite sex, collections of photographs and the like, or may pass on to the physical side in an introduction to vice or sexual malpractices. These are often the result of a strong imagination acting on a body insufficiently supplied with healthy recreative occupations.

Cricket, tennis, and hockey do not meet the needs of all, and the more morbid type has probably received better aid from the development of the activities of the boy scout movement and the like. The ethical side of the child must be considered and led into appropriate channels, but while exaggerated and precocious piety is a danger-signal, religious influence is all-important.

Difficulties of this period come to the notice of those who deal with adolescents who have to be encouraged to improve their education by using the facilities of the evening schools and yet restrained from over-exertions and too long hours. Many, if not most, after a hard day's physical labour are unfit for much, but in that which they do they should employ different systems, fresh nerve centres. Once the social needs are met a demand will naturally arise for suitable mental pabulum.

In respect of lack of emotional control precocious children resemble a group, the mentally defective, who differ from them in failing to respond properly to education by ordinary methods. The term mental deficiency and some similar terms have been rendered somewhat difficult to appreciate, as they have been employed in medicine, law, and sociology with somewhat differing connotations. So far as after life is concerned the all-important point is social efficiency or inefficiency, while the education

authority is more particularly concerned with questions of proper educability in one or another type of school. The two positions naturally shade into one another, but there are, of course, many children who need special modes of instruction, and yet may be reasonably successful in later life. If the intelligence of any considerable group be estimated and plotted out on a scale it will be noted that there is a continuous variation from the one end to the other, so that arbitrary limits have to be chosen if any class is to be specifically defined and delimited. Any child who proves unable to do ordinary school work under proper conditions as to attendance, opportunity, and health is certainly subnormal, and deserves special study to determine whether he should not receive special instruction. The best procedure with such cases is for the teacher to bring children suspected of mental deficiency before the school doctor at his visits. The doctor then examines the children for any remediable conditions. If treatment of these does not suffice and the failure to profit by the education persists, the child is submitted for the statutory examination required by the Education Acts relating to special schools. Many subnormal children do not come within the limits defining admission to special schools, although they may require special methods of instruction in backward classes or repeater classes such as are in use in some con-

tinental towns. If a child, as a result of special education or a longer duration of studies, is able to catch up to the acquirements of the average of his race and social class he may be regarded as being merely backward. Such children are often proficient in manual work or in games. Children who fail all round at school work, but who show reasonable intelligence in out-of-school activities, and who in graduated mental tests may be graded close to the average for their class, may be regarded as dull. If they should prove not only behind in school work, but also somewhat behind in mental tests, the dullness is of a character that may be regarded as the high level of mental deficiency ; although such children ultimately may prove not cases of arrested development, but merely of very serious retardation. Many are unable to benefit by the education in an ordinary class. Mental dullness may be the result of the physical condition and due to ill-health or debilitating conditions. Mental deficiency proper consists in the arrested development of the brain from local malnutrition or injury, or in a lack of development of a congenital and hereditary character. Children suffering therefrom offer little hope of recovery to the normal, but by training may be tuned up to yield better results than at first seemed possible. Care should be taken to secure treatment for all causes of chronic toxæmia, such as adenoids, carious teeth, chronic

constipation, and indigestion, as also of anæmia and of any deficiencies of the ductless glands, which may exert an adverse influence on the brain and its mental processes. With the treatment of these much temporary dullness or deficiency may be relieved. Mental deficiency may also arise through some failure of the special sense mechanisms—blindness, myopia, complete or partial deafness, crippling of the motor mechanism, and the like. Such cases are, however, usually dealt with through the medium of special schools for the blind, deaf, or the physically defective. It has been pointed out that there may also be emotional or volitional reasons—the child does not desire to learn. The reading, writing, and calculation which dominate modern school life are very recent racial acquirements, and the opposing activities preferred by the child may at no very distant period have been of far greater individual and social importance. Some of these difficulties may be overcome by a more practical and industrial curriculum or by general activities on primitive lines, such as form the basis of the boy scout training and are capable of developing all departments of mind. Many individuals are defective only in some special abilities ; some of these, as music and drawing, have little influence on the school career or on success in after life. Others, as the three R's, are so far fundamental that no reasonable progress can be made in an

ordinary school in their absence, capacity for reading at least being a postulate for education. Yet although failure in these respects constitutes undoubted mental deficiency, often of a permanent character, it does not necessitate failure in after life, although an undoubted handicap. Such defects are rarely pure ; there is usually some dulling of the general intelligence. In these cases special educational methods are required, and it is from the ranks of such children that the after results of special schools chiefly justify their existence. A deeper grade of deficiency is seen in the boy who is subnormal in almost all directions. Unless there is some counterbalancing advantage in the direction of a special ability, such a one is likely to prove a social failure and to gravitate, in the absence of proper home care, to a career of petty vice and crime. The definition of feeble-mindedness in the Mental Deficiency Act involves two points—need for care and control for the protection of the individual defective or of others, or permanent inability to profit by education in ordinary schools ; many will fall under the second head who escape the first, while a few reverse the process. By the use of graduated mental tests, of which the most carefully graded are those associated with the name of Binet, it has been shown that when a child passes the mental age of twelve years he can generally fend for himself, though it may be in some humble

capacity. Those with a mentality between ten and twelve often manage to pass muster, but those below this level usually need more or less continuous control. The lowest grades—the idiot, who cannot guard against ordinary physical dangers, and the imbecile, who cannot be taught to control his own affairs—are usually detected early in life. In all cases under the Mental Deficiency Act the condition must be due to mental defect from birth or an early age. To be liable to be dealt with under the Act, however, certain other features are needed : cases must be either neglected, abandoned, or cruelly treated ; liable to be dealt with by imprisonment or detention in an industrial school ; in receipt of relief while pregnant of an illegitimate child ; or specially reported to the authority by an education authority. In notifying any case, with a view to having it dealt with under the Act, the fullest details should be given, and these should not be mere hearsay, but be such as could be substantiated before a magistrate.

Certain children are defective in that they lack volitional control, and so are easily led astray by others or by their own emotions. Such children are often morally defective, though due allowance must be made for the strains of mischief and adventure to be found in all children. It must be remembered that cases can only be dealt with under the Mental Deficiency Act if in addition

to some permanent mental defect there is evidence of strong vicious or criminal propensities on which punishment has had little or no deterrent effect. In such cases it is necessary to prove the application of punishment and also to show the strength of the vicious traits ; petty pilfering and the like will not suffice. Probably the term was intended in the main to cover the more serious sexual offences sometimes committed by defectives of all grades, but with a special purpose of including the highest grades in which the evidence might scarcely justify a diagnosis of feeble-mindedness from an early age.

A final class of case has to be considered from the standpoint of education and after care—the epileptic child. The essential feature of epilepsy is recurrent, even if only momentary, unconsciousness. In major attacks there are convulsions, the child falls to the ground, becomes dusky in the face, and may wet himself. In minor attacks all that may be noticed is that he seems to lose himself for a moment ; sometimes an attack of excitement with automatic movements, though of a purposeful character, may replace a fit. Should the attacks be frequent or severe the child may be unfit for attendance at an ordinary school. It is well that statements with regard to this should be checked by reference to some one who has actually seen the child in a fit, for owing to the impossibility of proving

that a child never has an attack to allege the existence, this condition constitutes an easy excuse for keeping a child from school, while one attack may be made to serve for a long time, often perhaps on *bona fide* but mistaken grounds. Facilities exist for sending certain children between the ages of seven and eleven to country residential schools for combined treatment and education. Such children must have no other complaints, and must be of normal mentality or only very slightly defective. There is no provision as yet for the defective epileptic child apart from the Poor Law, a gap in the machinery which may be expected to be closed, on the return of more favourable circumstances, in view of the compulsory character of the Education Act of 1914.

Epilepsy is a common symptom in the chronic phase of most cerebral inflammatory conditions. Many children who have passed through schools for the physically defective suffering from cerebral (spastic) paralysis end their days in institutions for epileptics. Epileptic fits exert a harmful influence on all subjects. They may be rapidly recovered from, or the subject may remain for a time in a condition of post-epileptic automatism in which he may commit acts of which he will be ignorant on recovery ; after a fit there is always some degree of mental confusion. The besetting failure of the epileptic defective from the school

standpoint is said to be vanity and a desire to be always at the front, whether from praiseworthy or blameworthy reasons. They are usually favourites with teachers, notwithstanding that they are of all defectives the most likely to make baseless charges of ill-treatment against those set in authority over them and to support these charges with every versimilitude of truthfulness.

THE CARE OF THE TEETH OF THE SCHOOL CHILD

By R. DENISON PEDLEY, L.D.S., F.R.C.S.E.,

President of the School Dentists' Society.

If you will look into the mouth of a healthy child of three years and count the teeth to the right and left of the central line—taking the middle of the lower lip as your guide—there are five on each side in the lower jaw and five on each side in the upper jaw. Just the same number as the child's toes and fingers and as easily remembered. These teeth form the temporary set, which under normal conditions should gradually be replaced by teeth of the permanent set at ten years of age.

Examine also the mouth of a child of school age, five to six. It will at once be seen that the jaws have grown, for behind the fifth tooth —again counting from the central line—is a larger tooth or a space in which a larger tooth will emerge above the gum. These, when present, are the first permanent molars, four in all. These teeth meet on each side when the

jaws are closed, and form when healthy continuous grinding surfaces until twelve years. Behind these first permanent or six-year molars will emerge at twelve the second permanent molars, and at that age all the temporary set should have disappeared, to be replaced by teeth of the permanent set.

Summarizing the above-mentioned facts. At three years of age a child has ten teeth in each jaw, the temporary set. At six years of age, by the addition of four permanent molars, a child has twelve teeth in each jaw.

At twelve years of age, by the addition of four more molars, a child has fourteen teeth in each jaw, and the temporary teeth, when free from caries, should have been replaced by permanent teeth.

The six-year molar has a special tendency to decay, and is often mistaken for a temporary tooth.

The school age coincides with transitional changes in the jaws, and during this transitional stage it is of importance that the first set of teeth should be kept healthy until their functions are fulfilled, until they pass away and their places are taken by those teeth intended by Nature to last during adult life.

There are reasons for this statement which require some consideration.

Dental caries interferes with this transitional

stage. It prevents the removal, by natural means, of the temporary teeth. It causes much irregularity of the permanent teeth ; and the presence of disease interferes also with the health of the school child.

Prevalence of Dental Caries among School Children.

Investigations carried out during the past thirty years by members of the British Dental Association and by members of the School Dentists' Society prove conclusively that a vast amount of dental disease exists among school children. As typical of such investigations some figures may be given as to the extent of dental caries among children in four residential Poor Law schools. The schools were chosen for statistical purposes ; they formed convenient centres for examining at leisure every child and every tooth in each child's mouth.

Together the children examined numbered 3,800. Their ages ranged from three to sixteen years. A small number were examined at three years ; but the percentage of dental caries at that early age was 46. At four years it had risen to 62·7. At five years it was 72·5. At six years it was 87·9, where it remained almost stationary until ten years. At eleven years the percentage dropped to 74·7, coincident with the

loss of the temporary teeth. Then it rose gradually to 87·1 at sixteen years, when every carious tooth would belong to the permanent set.

From such evidence we conclude that dental caries commences before the school age; that during the school age it is progressive unless treated; and that it continues after the school age into adult life. It is also evident that 80 per cent. of the school children have defective teeth.

During the past eight years, since the Education (Administrative Provisions) Act of 1907 for England and Wales, and the Education Act of 1908 for Scotland, more than a thousand school medical officers have been examining the teeth of school children as part of their general medical examination. They fully confirm the above-mentioned facts, and in one of the latest Annual Reports of the principal Medical Officer he summarizes the matter by stating: "In general it may be said that of children inspected between the years of six and eight not less than 80 per cent. are found to be in need of dental treatment."

What is the Nature of Dental Caries?

In order to understand the nature of dental disease, which differs from all others, it is necessary to refer briefly to the structure of the teeth.

All that you can see of a tooth above the gum is covered by enamel. The hardest structure in the human body, it is composed of inorganic salts, and may be compared to the armour-plating of a vessel. Beneath the enamel is the dentine or ivory of the tooth, forming most of its structure, which may be compared to the oak or teak wood beams under the armour-plate. In the centre are the nerves and blood-vessels, the living portion, as in the centre of a battleship. It is evident that if by any means the enamel of the tooth is perforated, the softer structure of the ivory, or dentine, is the first to suffer extensively, until finally the vital structures, nerves, and vessels are destroyed. In these facts the analogy of the armour-plated vessel holds good.

Dental caries *always* commences on the outside. The process is partly chemical, partly bacteriological. Micro-organisms are innumerable. Without them we cannot live, and without them we do not die. No less than one hundred different kinds of bacteria may be found in the human mouth. They require for their culture a warm, moist chamber and material to act upon. The mouth is such a chamber, the debris of food is the material, plus the teeth when disorganized. The food material is found chiefly in the carbohydrates, such as is supplied by bread and biscuits when made from flour which is robbed of its fibrous material. This impalpable powder is often

bleached by chemical means to suit an artificial taste.

Briefly, the results are as follows: The debris of food left upon weak spots in the enamel, between the teeth or in crevices or folds on the surfaces of the enamel, undergoes fermentation owing to the action of bacteria. The starch is turned into sugar, the sugar is transformed to material which is acid. The acid dissolves at any one spot the enamel and results in a breaking down of tissue. When the dentine is reached the lime salts are dissolved, but much more rapidly. The gelatine which remains is attacked and dissolved by different bacteria. The nerve structures and blood-vessels become infected and destroyed to the termination of the roots.

The secret of keeping such an enemy at bay becomes clear when you understand what is the nature of dental caries.

1. The removal of all debris of food will deprive micro-organisms or bacteria of the material for destruction. This should be done after each meal, especially at night-time, when the jaws will remain at rest for eight or nine hours.
2. The removal of dental caries before the vital structures are reached, and the replacement of lost tissue by suitable fillings will preserve teeth for many years.

The first can only be carried out by the indi-

vidual to whom the teeth belong, the second by the dental surgeon, whose long training teaches him to preach prevention and to practise preventive treatment.

What is the Effect of Dental Caries on the School Children, Physically and Mentally?

" 1. The tooth which has ached is avoided in eating, and mastication, one of the most important of functions for the young, is rendered imperfect.

2. The caries which has caused pain has reached the blood-vessels in the centre of the tooth; these gradually become gangrenous and septic material accumulates.

3. The adjoining teeth often become carious by immediate contact.

These are uncontrovertible facts, and certain results follow.

1. Imperfect mastication is followed by imperfect digestion of food, thus favouring malnutrition.

2. The accumulation of septic material leads to a modified form of poisoning.

3. One defective tooth will make others defective." [1]

[1] "Report on the Effects of Dental Treatment on National Health and Physique," by R. D. Pedley and W. Fisk, International Dental Congress, 1914.

The nervous energy of a child is required for certain definite objects—

1. To fulfil the functions of the body.
2. To control growth and repair.
3. To acquire knowledge.

Dental disease, in so far as it causes pain, malnutrition, or septic poisoning, diverts nervous energy into wrong channels, and interferes with the acquisition of knowledge which a long and expensive education is intended to provide.

What has been done to Remedy these Defects in School Children?

A consideration of the facts might lead one to suppose that the difficulties of treating efficiently so vast an amount of disease are almost insuperable ; but it is not so.

The investigations as to the prevalence of dental caries referred to above, of which four residential schools were typical, has led to much being done. In the last twenty years 282 dental surgeons have been appointed to treat systematically the teeth of children in reformatory, industrial, truant, and Poor Law schools under State control. These children are under the direct control of guardians, who act *in loco parentis*.

It is not possible to trace these children into adult life and record the ultimate benefits they have received by systematic inspection and treat-

ment. There are, however, facts which are worth recording in connection with them.

Mr. Samuel F. Rose, dental surgeon to the Hanwell Schools, in a statement issued in April 1914, writes: "Dr. Salisbury, until recently Medical Officer to the Hanwell Schools, writing with regard to the benefits of regular inspection and treatment, states:—

"'One of the first things that struck me on taking up my work at the schools was the good condition of the teeth of the children. The contrast between their mouths and those of the children in the London County Council Schools, where I had recently been inspecting, was most marked. It is quite a rare thing to get a case of toothache, and I have only occasionally been called upon to extract a tooth between the dentist's visits.'"

The boys from the Poor Law schools are either taught a trade or enter the Army or the Navy. The girls are trained for domestic service. In sixteen years, from 1897 to the year 1912 inclusive, the number of children placed out in employment by the guardians of the London, Metropolitan, Poor Law schools was 20,679. Of this number 11,741 were trained boys, and 8,938 were trained girls. The average number annually is 1,292, and if we may assume that by the close of this year, 1916, that average number has been continued, 5,168 should be added. The

total number in twenty years will then amount to 25,847 boys and girls with clean and healthy mouths, free from dental caries, as the result of systematic dental inspection and treatment. Incidentally it may be mentioned that so successful is the training that only twenty-seven children were returned to the guardians in six years.

By such facts we have been encouraged to hope that school dental treatment might be extended to the day scholars attending the elementary schools in Britain, so that in time they may derive equally the benefits conferred upon the children in the residential schools.

The first really important step in that direction was taken in 1907 and 1908, when by Acts of Parliament in England and Wales and Scotland the medical inspection of the children in the elementary schools was inaugurated. In order to control these legislative Acts medical departments were established in connection with the Boards of Education, that for England and Wales with Sir George Newman as principal Medical Officer and an adequate staff. The objects of these Acts were to find out what are the defects in children, and afterwards gradually to discover the means by which these defects may be remedied.

There are in England and Wales alone 328 Education Authorities, and there are 1,800 sanitary areas, in each of which the Public Health

Authority (or Committee) has statutory duties to perform.

Both medical inspection and treatment were established on a public health basis, being linked up with already existing machinery of medical and sanitary administration. "Every school Medical Officer appointed by the Education Authority is appointed under the supervision of the Medical Officer of Health. In many areas he is also the Medical Officer of Health.

"There are 1,500 Medical Officers of Health, who are chiefly concerned with the environment of the community, such as drainage, sewage, housing, etc., also with the sanitation of schools, with epidemics and tuberculosis. These are controlled by the Local Government Board, whose chief medical officer, Dr. Arthur Newsholme, C.B., issues an Annual Report as to the health of the whole community, with an analysis of the Annual Report of each Medical Officer of Health.

"This legislative action has, and will have, a far-reaching effect on the progress of the treatment of dental disease." [1]

Under the heading "Prevalence of Dental Caries" reference has already been made to the findings of more than one thousand school Medical Officers; but it is interesting to record the fact that as each school Medical Officer issues an

[1] "Report on the Effects of Dental Treatment on National Health and Physique," International Dental Congress, 1914.

Annual Report the reports during the past eight years have been disseminated throughout every educational centre in the country, and in consequence an educational influence as to the defects found in children is being gradually created which is of untold value.

The results so far are encouraging in every way. A reference to the last Annual Report of the principal Medical Officer to the Board of Education, 1915, shows that in 204 Education areas, treatment centres or school clinics have been established for the treatment of ailments found among scholars. In 130 Education areas 200 dental treatment centres have been established. "The number of dentists employed was approximately 200, of whom 51 were giving their whole time to school work," and "it is estimated that the provision indicated is sufficient to undertake the treatment of 375,000 children."

What Remains to be Done?

In the year 1914 there were 6,078,895 children in the elementary schools and 180,507 in the secondary schools of England and Wales, and that number will gradually increase year by year. At the very least 75 per cent. suffer from dental disease. If we estimate the number of school children attending the elementary schools at

6,000,000, 4,500,000 require dental treatment. If we assume that a whole-time dentist can treat 3,000 children, in addition to inspections, lectures to parents and teachers, etc., 1,500 whole-time dentists will be required. In this, one of the most important branches of public health work, there is ample room for trained women as well as men. From the above-mentioned facts it will be gathered that the school dental service is only beginning. Would space permit, it would be interesting to discuss the objections to this wholesale method of treating one disease in childhood; but it is in reality and in so far as expense is concerned the truest economy. In the light of the present war, such beneficial expenditure may be checked for a time; but when consideration is taken of the valuable lives destroyed, who shall estimate the value of our child life and the urgent necessity for keeping them in health to fight the battle of life?

MALNUTRITION

By C. J. THOMAS, M.B., B.Sc., D.P.H.

NUTRITION is the process by which the health and various activities of the body are maintained by the proper adjustment of income in the form of food to loss, whether by work or by heat, and to absorption for the purposes of maintenance and (in the case of children) of growth.

Malnutrition is the condition which ensues upon continuing disturbance of the normal balance through insufficiency or unsuitability of food, through over-expenditure of energy, or through interference by disease or unhealthy surroundings with absorption, distribution, and utilization of nutriment.

The body is frequently compared to a steam engine, and in some ways this comparison is very useful. The steam engine consumes fuel, which may represent the food in the case of the body ; it transmutes the energy of the coal, distributes the energy, and performs work. The body also consumes fuel in the shape of food, burns it, and in so doing performs work. But this mechanical simile breaks down if pushed too far, because

the human body is a living organism, and in the case of the child, it is a growing organism. The steam engine in the absence of fuel stands idle, but is ready for work again when its fuel is renewed, but the human machine in the absence of food perishes almost at once. A better simile would be that of an army which is a living and growing organization. It receives energy in the form of supplies, it distributes the energy thus obtained according to an organized plan, thus maintaining its strength, and it applies its energy to produce definite results. Similarly with the human body nutrition is the question of supply of energy in the form of food, of distribution of the supplies, and of spending energy in all the various activities which make up life. Malnutrition ensues if the income is less than the expenditure, or if the distribution is at fault. In children the matter is further complicated by the imperious necessity for growth ; this makes the question of the feeding and well-being of the child a different problem from that of the adult. You will go very far wrong if you assume that the war-economy measures which are sauce for the gander are also sauce for the gosling. But not only must the total amount of the supplies be enough, but also the relative proportions of the various kinds of supplies must be properly balanced if efficiency is to be maintained. The efficiency of our young and

growing army was sadly interfered with because one kind of shell was not forthcoming in sufficient abundance. In the same way in the case of the human body the kinds of food must be duly proportioned. Just as the army would perish if supplies of high explosive shells failed, no matter how generous the supply of shrapnel might be, so the body would perish if no meat or other curd food was forthcoming, no matter how much sugar or oil was available.

The absence of meat cannot be made up by eating an extra quantity of potatoes.

In general it may be stated that where malnutrition is due to defect in the supplies it is more often due to want of proper proportion among the ingredients than to absolute want in amount.

Improper feeding is more common than insufficient feeding. Ignorance is always a greater enemy than want, and at the present time this is especially true.

Malnutrition, then, is a complex process depending upon a variety of causes, and no other part of the Care Committee worker's duties is so important as the share he or she must take in the medico-social investigation which is necessary in every case of malnutrition which comes to light.

The chief medical officer of the Board of Education says : [1] "Defective nutrition stands in

[1] Annual Report, 1910.

the forefront as the most important of all the physical defects from which school children suffer. Indisputable though the fact is, there is no subject the elucidation of which is more baffling to the medical inspector, no condition more difficult accurately to estimate, with causes more complex and interwoven. Every child found suffering from defective nutrition requires, therefore, individual study and thought."

Extent of Malnutrition.

The schedule of medical inspection of school children provides for the assessment of nutritional condition of children. The children are thereby placed in four categories, viz. (1) good, (2) normal, (3) below normal, and (4) bad. Taking the last two categories together as representing two degrees of severity, the amount of under-nourishment present in the school population runs between 10 and 15 per cent.

In assessing the nutritional state of the child the measuring-rod and scales are instruments of the greatest importance, and in conjunction with these is necessary a table of normal heights and weights. The table on p. 110 gives the average heights and weights for each age for boys and girls separately, but it does more than this, for it gives the weight that a child of a given height should turn on the scales; for it is found that

the age of a child does not materially affect the ratio of height to weight. Thus a child aged eight who measures 130 centimetres, which is the average for a child of ten, should also, like the child of ten, weigh 27.6 kilogrammes.

TABLE OF AVERAGE HEIGHTS AND WEIGHTS IN CENTIMETRES AND KILOGRAMMES OF CHILDREN ATTENDING LONDON PUBLIC ELEMENTARY SCHOOLS.

	BOYS.		GIRLS.	
Age.	Heights.	Weights.	Heights.	Weights.
3	92	14·5	92	14·3
4	98	16	97	15·5
5	104	17	103	16·8
6	109	18·7	108	18·2
7	116·0	22	115·4	21·2
8	120·5	23·5	120·2	22·9
9	125·2	25.5	124·7	25·0
10	129·8	27·6	129·9	27·2
11	134·3	29·9	135·0	29·9
12	138·7	32·5	140·6	33·3
13	143·1	36·4	146·8	37·7
14	148·3	39·2	152·4	41·8

N.B.—Heights and weights under 7 belong to a separate series of measurements upon smaller numbers of children and are probably below the general London average.

The average is, of course, made up of both fat and thin children, so that a child who is in good health and nutrition may weigh less than the average for his height; on the other hand, the average weight is derived from a number of children 10 to 15 per cent. of whom are ill-

nourished, so that any child who is appreciably under the corresponding weight for his height should be subjected to very careful medical examination to ascertain whether this is merely due to natural causes or due to interference with normal nutritional processes.

The ordinary appearance of the ill-nourished child is often deceptive. The effects of ill-nourishment are selective in their distribution. In starvation it is the nervous system which is the last to be affected. In the earlier stages, too, the face is spared, and it would seem as though it was a wise provision of Nature which attempted to hide from the enemy for as long as possible the fact that the family or tribe was becoming weakened by privation. When malnutrition has reached the degree that it is apparent to every one, it is already so far advanced that nothing but heroic measures can combat its effects.

The Investigation of the Cause.

This investigation requires much knowledge, skill, and patience. Malnutrition is not synonymous with under-feeding, and it is not enough to simply place the child upon the feeding list for a month and think that the work is done. A very comprehensive study of home conditions and of past history is necessary, and in this there must be the closest co-operation between the doctor

and the social worker if serious errors are not to be made.

Systematic weighings should be carried out to ascertain the effect of the measures taken.

In London a special investigation is made of every case returned at the medical inspection as "bad nutrition." A form for describing the home conditions, and results of steps taken, is filled in by the voluntary worker, who should also note whether the mother goes out to work, and whether the child is employed in a wage-earning capacity out of school.

The Causes of Malnutrition.

Analysis of a large number of completed reports gives the relative importance of the various causes of malnutrition, and many surprising facts are brought to light. About 30 per cent. of the children come from homes described as superior, where the parents are comfortably off, and in many cases where it is stated a maid is kept. Less than half the children come from homes in which there is grinding poverty. It does not do, however, lightly to assume because a home is superior that there are no hygienic faults, or even that there is adequate supply of nourishment for the children. Malnutrition among the children is not infrequent in the families of clerks who have to spend an undue proportion of their income in

living up to their position. Again, in one district where the husbands are in receipt of good pay, but where a considerable amount of under-nourishment was found in the children, it was stated that the fathers lived in their own houses, but that these were built with borrowed money, and the repayments taxed the resources of income to such a degree, that the family as it grew had to go short.

Again, *poverty* may produce its effects not so much by absence of sufficient food as by the influence of overcrowding.

Neglect as a cause enters into 6 per cent. of the cases, and was associated in many instances with drunkenness of the father, of the mother, or of both.

Tuberculosis was present in 20 per cent. of the cases, but the whole problem of malnutrition is identical with that of tuberculosis. Tuberculosis is not to be looked upon from the social point of view as a disease so much as a symptom. The social causes of tuberculosis are identical with those of malnutrition, and the alleviation of the social faults is in each case the secret of treatment of the trouble. Malnutrition is always the precursor of tuberculosis. The seeds of tuberculosis are ubiquitous. All town children are constantly menaced with it ; the majority of them fortunately are able in the presence of adequate food and sufficient fresh air to ward off the attacks, but few altogether escape attack, and with the

continuance of the state of malnutrition a child is the almost certain victim of the disease.

Decay of the teeth with oral sepsis is present and deemed to be a contributing cause in 12 per cent. of the cases.

Enlarged tonsils, adenoid growths, and ear discharge are given as a cause in 9 per cent.

Rickets is described as a cause in 7 per cent. This disease is itself a disturbance of nutrition, is exceedingly rife in townbred children, and is almost invariably due to ignorance in the rearing of infants, improper feeding and lack of fresh air being the two great influences in its causation, although recent researches seem to show that bad housing is more preponderant in the production of rickets than improper feeding.

Many of the children entering school are already debilitated by the effects of illness during babyhood, and it will be the work of the newly established schools for mothers to diminish the toll taken, during the years of babyhood, not only of infant life, but also of the vitality of the children.

Other diseases, past and present, were mentioned in 16 per cent. of the cases, and amongst these *digestive troubles* were very prominent.

All the causes already mentioned are concerned with the supply of food, either in quantity, quality, or preparation, with interference in absorption of food due to bad teeth or digestive troubles, or with faulty distribution of the food owing to

disease. Confined to the better homes is a well-defined class of children of *nervous type* with congenital weakness, and not infrequently with a history of premature birth. This class of child represented 5 per cent. of the whole. They are often "only children," and they are always "spoilt" children. They are the most difficult of all to deal with, for their condition is due to inborn defect. They are not found in the poorest homes, because it is only by the lavish expenditure of solicitous care that they survive the perils of infancy.

There is yet a class of case involving 10 per cent. of the whole, in which a main cause of under-nourishment is undue loss of energy; the three chief factors being rapid growth and over-employment—both in older children—and want of sufficient sleep—especially in younger children—due to late hours and often to disturbed rest owing in many cases to parasites. In my experience a child who is subjected to the continual onslaught of fleas is always ill-nourished.

To these may be added as a contributory cause insufficient clothing.

In a large number of the cases lack of parental care is obvious. In the better-class homes the mother is often ailing or dead; in the others the mother is out at work all day—and this is a very important factor—sometimes she is a widow, sometimes she supports an ailing

husband, or is deserted ; often, too, one or other parent is a drunkard, or even both.

The bare recital of these conditions associated with malnutrition is sufficient to show the complex and arduous task which is undertaken by the worker to whom responsibility for the sociological inquiry is entrusted.

Action Taken.

In all the cases embraced by the above inquiry the children have been followed up and the results worked out after careful medical re-examinations. The measures taken comprised school feeding, medical treatment, convalescent treatment, and other means, such as advice and help in improving home conditions. Of these measures convalescent treatment was, as might be expected, the most successful by far in individual cases. The best results generally were amongst the good homes, but it is curious to note that children from fair and doubtful homes did not do so well as those from definitely poor homes. Standards of necessity which apply in normal cases should not be enforced too rigorously when children who are already ill-nourished are in question. Where home resources may be adequate when the inmates are in good health, the presence of illness in the home necessitates the provision of articles which would constitute luxury if no ill-health

existed, and the provision of such comforts, as, for instance, extra milk, is beyond the means of many homes assessed as "fair." In making assessments, therefore, a cast-iron scale which allows a definite amount per child should not be adopted. It would be wise to allow for an ailing child at least as much family income as for two healthy children.

The most startling cases of individual improvement, in addition to those in which convalescent treatment is obtained, are cases where dental treatment is carried out.

The Feeding of Children.

Children differ from adults in regard to the relative proportions of the ingredients necessary in their food, and also in regard to the relative amount of food daily required.

The average adult can do with much less than the quantity of protein food habitually taken. Now and then a middle-aged sufferer makes the discovery of, to him, the surprising fact that giving up animal food improves his health, and he forthwith becomes the apostle of a "system" of food reform. But this sort of reform only leads to disaster if applied to children. The child must grow, and the only kind of food which will supply the frame-forming elements necessary are those foods rich in protein,

which are typically represented by meat, cheese, milk, and eggs.

Children also require a larger relative quantity of food because of their greater relative loss of heat than the adult. It follows, therefore, that the food of the child must be more concentrated than that of the adult.

The under-nourished child, moreover, is in the firing line, exposed in a special degree to the menace of disease, and requires the special provision of high explosives in the form of fats ; the persuasion of such a child to partake of sufficient fat taxes greatly the ingenuity and patience of those who have to deal with him. Children reject the fat of meat ; it is not in a form which is easily assimilable ; milk and cod-liver oil are the forms in which it can most easily be digested. Starches and sugars, which form the third chief class of food, are relatively abundant and cheap, but they cannot in the case of the child take the place of proteins, or in the case of the ill-nourished child of fats.

Another point in regard to food supplies is freshness. A diet may have sufficient proteins, fats, and starches in the right proportions, but yet may not nourish because of the absence of certain elements which are found in fresh food, and which are necessary to life. Amongst these are vegetable salts and certain substances found especially in milk which are termed

vitamines. A number of children in the poorer town areas, and especially in London, suffer from want of fruit, fresh vegetables, and fresh milk.

It is well known that in the days of sailing ships during long voyages sailors in the absence of fresh food used to perish from a disease known as scurvy. There is a similar disease in town children termed scurvy rickets. The story is told of a child brought into a hospital ward suffering from this disease and apparently in a dying condition. In the next bed was a patient who had been left some grapes by a visitor. Attention was distracted for a while from the child, and when the doctor and nurse returned two miracles had occurred. The grapes had disappeared. The child, who had appeared to be in a dying condition, was, however, sitting up in his cot, smiling.

School Feeding.

Before Care Committees were established and before school feeding was recognized by Act of Parliament, teachers were confronted with the difficulty that arose owing to the fact that they were expected to teach and get results from children who were necessitous and hungry. A considerable amount of feeding was carried out in connection with the schools by the teachers on a purely voluntary basis. After the issue of the Report of the Interdepartmental Committee on

Physical Deterioration, the Provision of Meals Act was passed in 1906, empowering authorities to expend money from the rates for this purpose, and a large proportion of the time of Care Committees is taken up in the duty of administering this Act.

The meals provided by the authority are usually dinners. In general the parent can provide sufficient starchy food, and the meal provided by the authority needs to be one rich in proteins. This disposes of the question whether breakfasts or dinners are most suitable. Breakfast is largely a starchy meal, while dinner is a protein meal.

The work of school feeding is largely preventive ; when properly carried out the necessitous child is caught before malnutrition appears, and the whole question then remains purely social and not medical.

A different question arises over the doctor's cases detected at medical inspection. In these cases malnutrition already exists ; a large number are not necessitous. At every feeding centre a certain number of children sit toying with their food, unable to take the rich meal provided. The child suffering from malnutrition is an ailing child, appetite is often absent and may even be perverted.

It is necessary that the supervisors of feeding centres should be skilled and intelligent. Children obviously unable to profit by the meals

provided should be brought to the notice of the school doctor.

For these cases a way out has been found in the provision of milk at school, generally in the morning recess. A large number of "milk meals" are now being given in London, and it is found that ill-nourished children with weak powers of assimilation do very much better on this plan than if put upon the ordinary dinners. The ill-nourished children from better homes, too, are able to share this provision with advantage, as the parents are often willing to pay the cost in full.

Milk is the great stand-by in all cases of malnutrition, as it contains in itself not only all the food-stuffs necessary, but also contains substances of special and unique value in states of debility.

Cod-liver oil is another food of great value, and is given in the form of meals to children in the same way; but the amount of cod-liver oil allowed in London is limited to the value of £50 per anum.

Medical Treatment.

A large number of the children suffering from malnutrition require, in addition to extra nourishment, medical treatment in some form or other. The good results of dental treatment have already been noted. Operation for tonsils and adenoids

is often required. These overgrowths obstruct the nasal passages and interfere with normal breathing.

Nutrition depends not only on supply of nutriment, but also its proper oxidation or burning in the body. A dull fire does not always need more fuel ; it requires raking out the embers to allow a full supply of air.

Fresh air is therefore essential for good nutrition to be maintained. On one occasion I had planned to visit an open-air playground class in the East End with a Government inspector on Empire Day.

When we reached the school all the children were massed together in the hall. Without making any inquiries I was able to point out to my companion the playground children, who manifestly exuded health, the contrast between the playground class and the other children being exactly that between a bright and a dull fire.

The importance of sufficient air space in the home and open windows at night must be constantly impressed upon parents. The tuberculosis dispensary is also a very important agency in the treatment of malnutrition.

Excessive Expenditure of Energy.

It is only in a few cases that the existence of malnutrition is to be alleviated by cutting down

excessive expenditure of energy in childhood. The child needs to be intensely active, and no interference with natural activity should be made unless in exceptional circumstances and under medical advice. Want of sufficient sleep, however, is a condition which will be frequently met with, and parents need to be impressed with the need for early hours of retirement and undisturbed rest in an airy bedroom. At times of rapid growth this is especially important, and it is at these times that enforced rest in the daytime may also be advised.

It should be remembered that growth is not maintained at a steady level throughout school life ; there are seasonal variations in the rate of growth within the bounds of a single year, and there are special times in school life when growth proceeds at a maximum intensity, as, for example, in girls at the time of the leaving examination, when malnutrition, contributed to by this cause, is often found, and when rest is especially to be prescribed owing to the frequency with which spinal curvature develops.

In some cases excessive employment of the child may be ascertained, and in the case of ill-nourished and debilitated children all forced labour should be rigorously forbidden.

The conclusion is that malnutrition is an exceedingly complex condition, which is intermingled with every aspect of social difficulty,

including housing, habits, ignorance, apathy, and want: the following up of the cases requires expert social knowledge and almost unlimited expenditure of time. In each individual case constant association and co-operation between the voluntary worker and the doctor is needed if a true estimate of the causes of the condition is to be arrived at, if the effect of measures taken is to be satisfactorily ascertained, and if the necessary adjustments in the child's interests to be made at home and school are to be carried out effectively.

Progress has undoubtedly been made, but much remains to be done, especially in the direction of knitting together all the agencies, whether voluntary or official, lay or medical, which are concerned in the social improvement of the families from which our elementary school children are derived.

THE CARE OF THE NOSE, EAR, AND THROAT

By ERIC PRITCHARD, M.A., M.D.

THE common affections of the nose, throat, and ears with which you, as teachers or members of School Care Committees, will probably be most familiar are the common snuffling cold, tonsils and adenoids, and discharging ears. All of these troublesome conditions are, directly or indirectly, due to infection with disease-provoking germs, and the symptoms produced represent the calling into play of certain defensive mechanisms designed to kill the germs and prevent the still more serious consequences which follow when they develop unhampered in the system.

One of the great distinctions between living tissues and the devitalized tissues of dead animal matter is that the former show fight—and, as a rule, a successful fight—against the invasion of germs, whereas the dead material offers no resistance, and is soon eaten up and reduced by the activities of the bacteria to the condition of smoke and ashes. Speaking in quite general terms, we may say that the resistance to bacteria offered

by healthy living tissues is covered by the term *inflammation*.

The immediate and remote results of inflammation may be exceedingly unpleasant, but they do not necessarily involve death, so that individuals attacked by hostile bacteria recover and live to fight another day.

If a bacterial invasion of the nose or throat occurs, the defensive mechanisms of the mucous membrane are at once brought into play. Perhaps an attempt is made to dislodge the enemy by sneezing or coughing, or if, as usually happens, the foreign matter is not ejected by this means, resort is had to subsidiary lines of defence. The most important of these are : (1) the assembling together of whole armies of leucocytes, or, as they are commonly called, *phagocytes*, at the threatened point, and (2) the manufacture of antidotes or antitoxins by the blood for the purpose of poisoning and overwhelming the enemy. These defensive reactions involve the bringing of much blood into the danger zones ; and if these happen to be the entrances to the respiratory system the blood-vessels of the throat or nose become enlarged or dilated, so that the parts become red, congested, and painful—in other words, "inflamed." The increased blood flow leads to activity of the mucous cells and the pouring out of that clear glairy secretion familiar as running from the nose during the commencement of a

cold. If the fight is not immediately terminated, and the number of phagocytes or reserves which it is necessary to call up is great, the clear secretion soon assumes that thick creamy appearance which is technically known as a muco-purulent discharge. The turbidity of such discharges is due to the presence of a large number of dead leucocytes or pus cells.

Viewing these inflammatory reactions in this way, such a symptom as nasal catarrh must be regarded rather as a blessing to be welcomed than as an evil to be countered and treated with antagonistic remedies.

Consider now whether infections of this kind are necessary evils, and whether it is possible by preventive means to keep the bacterial enemies which produce them at bay. It is only under very exceptional conditions that the air breathed can be germ-free: wherever there is dust and dirt and decaying matter on which bacteria can live there will these natural scavengers be gathered together. In Arctic regions, where there is little but snow and ice for bacteria to live upon, the air is almost completely germ-free, and under such conditions colds and infectious catarrhs are practically unknown; but under conditions of town life, or, indeed, of rural life, in temperate or tropical climates it is practically impossible to keep free from aerial infections. But there will always be a greater number of germs where the conditions of

ventilation are bad ; where there is much dust ; where sunlight does not penetrate ; where the temperature is high and favourable for microbic life, and where there is much human traffic. It is difficult to imagine a medium more favourable for a high bacterial content than the air which the average elementary school child in London is compelled to breathe at home, at school, and in the streets.

It must be remembered that the interior of the nose is expressly designed to act as a filter for the air before it passes into the more vulnerable and delicate air passages lower down. As the air passes over the folds of mucous membrane which cover the turbinate bones, it is warmed and moistened as well as filtered : the mucous cells which cover these bones are worked very hard, so that it is easily understandable that the health and comfort of the individual very largely depend on the efficiency with which these particular duties are carried out.

If a child does not breathe in a natural way through the nasal passages, but through the mouth, all these duties fall upon the mucous membrane of the mouth and throat—duties for which these parts are not so well adapted.

The tonsils are, however, most important germ-killing organs ; set in a position on each side of the fauces, like two great fortresses, they guard the approaches to the inner air passages. The

tonsils are composed almost entirely of lymphatic tissue ; indeed, they may be regarded as potential lymph glands, capable of enlarging or becoming smaller according to the duties that are imposed upon them. The tonsils, as well as the lymph glands, are valuable filter beds for catching and retaining particles of foreign matter which would otherwise gain access to the blood and internal organs. In the interstices of these lymphatic structures are crowded vast numbers of leucocytes or lymph cells, which fall upon and devour the foreign matter which would otherwise pass through their meshes.

The masses of lymphatic tissue which develop at the back of the nose and in the pharynx, especially round the orifices of the two Eustachian tubes, are commonly called adenoid growths. They serve the same purpose and supplement the work of the tonsils. The more contaminated the air, or the larger the number of microbes in the mouth, the more work for the tonsils and their auxiliaries—the adenoids—to do. Hence it is easy to understand why in the town-child tonsils are so often enlarged, and why adenoids so frequently develop at the back of the nose. If the leucocytes or phagocytes contained in the tonsils and adenoid overgrowths are efficient and good fighters, it will be unnecessary for these defensive structures to grow to any great size in order to confer adequate protection ; but if they are but poor fighters, a

large number will be necessary, and the tonsils and adenoids will become greatly hypertrophied. The difference in the degree of efficiency shown by phagocytes and lymphatic structures in the work they are called upon to perform in defending the body against microbic foes, explains why, under practically the same conditions, tonsils and adenoids vary so much in size in different children.

I have watched the development of many cases of mouth breathing in infants, and feel convinced that accidental deformities of the nose and of the soft palate play very important parts in bringing about the condition. On the other hand, when hypertrophy of these structures has occurred it enormously aggravates the necessity for mouth breathing. If an infant or a child suffers from any natural narrowing, or *stenosis*, of the nostrils, breathing through the nasal passages is greatly impeded or rendered impossible. Again, if paralysis or want of mobility on the part of the soft palate interferes with the to-and-fro passage of air along the post-nasal route, there will be a strong incentive for the respiration to take the form of mouth-breathing. If the breathing is of this character, the nasal passages will, from want of use and want of ventilation, become hot, stuffy, and badly drained. Mucous discharges will therefore tend to accumulate in the many recesses of the nasal chamber, and afford all those conditions

which are favourable for bacterial development, and thus is established a vicious cycle.

A consideration of these facts suggests that there is not one cause of adenoids and tonsils, but many, and that it is impossible to answer in one word how it is that these hypertrophic growths develop.

It is mere nonsense to say that comforters, the eating of pappy food, carious teeth, or stuffy rooms are *the* essential causes ; they are contributory factors, but not the prime ones, in the etiology.

The secret of preventing or arresting the development of overgrowth of both tonsils and adenoids is to study the existing and contributory causes in each case, and then to remove them. The expedients which are most useful in the prevention may be briefly summarized as follows :—

The prevention of aerial sources of infection of the air passages—

(*a*) by good sanitation, by prompt removal of dust and household refuse, by the watering of the streets, by paving of yards, etc. ;

(*b*) by keeping the mouth, nose, and pharynx clean, free of mucus, debris of food, etc. ;

(*c*) by strengthening the natural defences.

The local defences can be improved by all such procedures as breathing exercises and the

mastication of hard food, which tend to develop the jaws and maintain a good circulation in the region of the naso-pharynx.

The general defences can be improved by the hygienic methods which are employed to raise resistance in cases of consumption—i.e. by dietetic and open-air treatment.

Remedial methods for the treatment of tonsils and adenoids are almost exclusively confined to surgical operations. The decision, whether in any case the tonsils and adenoids should be removed or not, must be left in the hands of the expert.

The presence of tonsils and adenoids—in other words the mere hypertrophy of the protective mechanisms—does not justify their removal. If they are doing their work well under existing circumstances, the individual need not be deprived of their help ; but it often happens that in the struggle against bacterial infection the tissues of these lymphatic structures are so seriously injured that they become a source of danger rather than a help. Then, of course, an operation is necessary.

Tonsils with little abscesses in them, or little plugs of caseating matter, serve as chronic *foci* of infection, and are therefore better removed. Or, again, the tonsils may be so large that they block up the fauces, or the adenoids so numerous that they fill the naso-pharynx ; in such cases the interference with breathing, speaking,

sleeping, and swallowing which they occasion may justify an operation.

Constant irrigation of the nose with a mild antiseptic douche is of the greatest value in the treatment of commencing adenoids in infants. The teaching of breathing exercise and proper methods of blowing the nose and the use of the handkerchief also assist the objects in view. These expedients can be employed in the case of quite young children.

The remote results of adenoids and tonsils are so serious that almost any means are justifiable to prevent such developments. Among the more important results must be included all those deformities of the chest which follow from obstruction to the entry of air—that is to say, a contracted thorax and pigeon chest. Defective respiratory movements and want of oxygen in their turn lead to impaired nutrition and anæmia. Further results are deformities of the bones of the face and the so-called adenoid expression. Extension of the inflammatory or catarrhal processes in the nasal chambers themselves may lead to inflammation or abscesses in the *antrum* and other *air sinuses* which communicate with the nasal cavities. Inflammation of these inaccessible cul-de-sacs is a very serious matter. But probably the most important result of such extensions of inflammation, and the one which concerns us most, is extension along the Eustachian tube to the

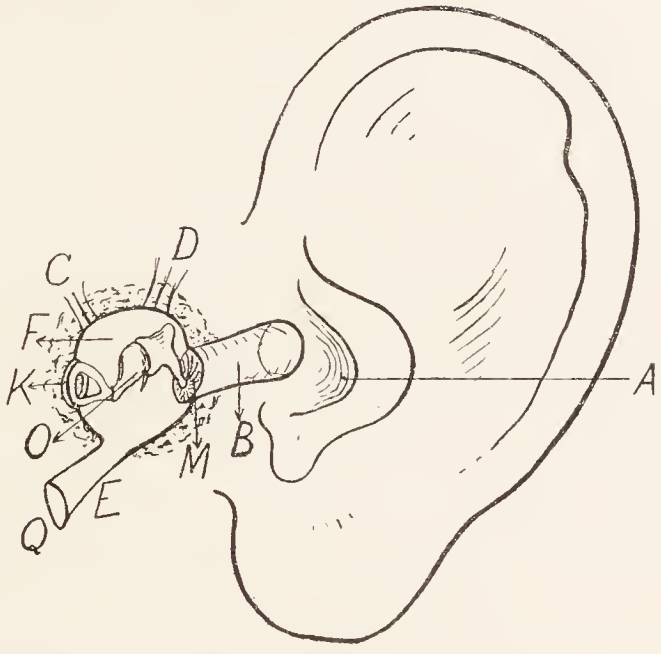
middle ear, for such an event almost inevitably leads to a discharge from the ear, and possibly to deafness also.

A short consideration of the anatomy of the parts concerned will help to explain the ease with which extension occurs in this direction and the significance of the symptoms which follow.

The middle ear or drum, the part in which suppuration occurs in discharging ears, is the connecting chamber between the external ear and the internal ear. The vibrations of sound as they fall upon the ear funnel (A) are directed down the external auditory meatus (B) and impinge on the tympanic membrane (M), which they set in vibration, just as the parchment of a drum is made to vibrate when it is struck by the drum-stick. The vibrations thus caused are conducted across the middle ear (F) by a connecting chain of little bones or *ossicles* (O) to another membrane (K), which is also made to oscillate and convey its movements to the labyrinth or internal ear. It will be thus readily understood that for the proper appreciation of wave sounds, the middle ear must be intact and healthy. If the membranes of the ear, or the connecting rod which joins them, are destroyed, the individual will not be able to hear—will, in fact, be deaf.

Now the function of the Eustachian tube (E) is to ventilate and drain the middle ear (F), and allow the pressure of air on each side of the

membrana tympani (M) to be equal. If the pressure of air in the cavity is greater than that outside in the external auditory meatus, the membrane will necessarily bulge outwards, and if less, it will be incurved towards the cavity. Such bulgings or depressions would seriously interfere with the



DIAGRAMMATIC REPRESENTATION OF THE ANATOMY OF THE MIDDLE EAR.

(A) Pinna of ear; (B) External auditory meatus; (M) Membrane or drum of the ear; (O) Chain of ossicles; (E) Eustachian tube; (Q) Orifice of Eustachian tube opening into pharynx; (K) Membrane communicating with internal ear; (C) Channel of communication with base of brain, through bony wall of cavity; (D) Channel into mastoid cells; (F) Cavity of middle ear.

efficiency of the membrane as a part of the conducting apparatus, and there would be impairment of hearing and possibly pain. It is therefore obviously important that the Eustachian tube should remain open and pervious to air. Adenoids growing round the orifice (Q) of the Eustachian tube in the posterior wall of the pharynx tend to

block up these ventilating tubes of the middle ear and to interfere with that automatic opening up of their orifices which normally occurs during the act of swallowing.

The ill effects of adenoids in connection with the ear may be stated as follows :—

(1) They interfere with the ventilation of the middle ear.

(2) They obstruct drainage.

(3) They predispose to the extension of catarrhs and inflammations from the throat up the Eustachian tubes into the middle ear.

Inflammation of the middle ear is serious, because it may lead (1) to destruction of the chain of ossicles (O) ; (2) to perforation of the drum-head and discharging ears ; (3) to extension of inflammation through the little communicating passages (C and D) in its bony walls into the brain, or into the mastoid cells, giving rise, in the first case, to meningitis, and, in the second case, to mastoid disease.

The prevention of middle-ear disease is therefore of very considerable importance. Its prevention chiefly depends on the avoidance of tonsils and adenoids, or on their early treatment should they develop. Since one of the commonest forms of meningitis and almost the only form of mastoid disease are both dependent on middle-ear disease, it is clear that both the prevention of

middle-ear disease and its immediate cure are matters of the greatest concern in the case of children who are specially liable to these diseases.

In the general catarrhs that affect the mucous membranes in measles, scarlet fever, and other of the exanthematous diseases, the Eustachian tubes and middle ear are liable to be involved in the inflammatory process. The results of such catarrhs are more likely to be serious and to proceed to suppuration, discharging ears, meningitis, and mastoid disease, if the drainage from the Eustachian tube is interfered with by adenoids surrounding the orifice (Q), than if the pharynx is healthy. Hence such accidents may be expected if a child suffering from tonsils and adenoids is unfortunate enough to contract one of these diseases. It is useful for members of School Care Committees to be armed with a knowledge of such possibilities when dealing with or arguing with those parents who have what are called conscientious objections to the performance of operations on their children's throats.

Deafness due to perforation of the drum-head and the destruction of the ossicles is a very serious obstacle to the making of a satisfactory living; such a disability may definitely detract from the market value of the individual. Hence every care should be taken both to prevent and all means possible to treat the early symptoms of middle-ear disease.

THE TUBERCULOUS CHILD

By J. EDWARD SQUIRE, C.B., M.D., F.R.C.P.

I PROPOSE to consider the subject from the general point of view of the large number of children affected by disease, and the effect on the health and the working capacity of the nation at large.

There are some ten thousand or more children under the age of fifteen who die from tuberculosis every year in England and Wales, and yet tuberculosis is a preventable disease. That is bad enough—that there should be ten thousand children under the age of fifteen dying from this disease which ought to be prevented, since it is under our control—but that does not represent the total effect of tuberculosis in childhood. Fortunately, a large proportion of children who get tuberculosis recover; those do not come, of course, into this ten thousand; there are many also who do not recover, but eventually die from the disease after they have passed the age of fifteen—the disease is a long-continued one—so that they also do not come into this ten thousand. Then there are others who recover,

but recover crippled for life, so that although they are not actively tuberculous they are still hampered for the rest of their lives as the result ; they also do not come into this number of ten thousand and upwards. Thus the question of tuberculosis in childhood and how to prevent it is one of real national importance, because of the large numbers affected and the serious amount of damage done by the disease.

The disease is preventable from the nature of its causation, which is or ought to be under control. It is caused by the entrance into the body and the development in the body of a special micro-organism, a minute living fungus, which, breeding in the body, produces first of all local effects in the part in which it has settled down, and, secondly, general illness. Local effects are due to the irritation of the parts around the growth of the fungus. The general illness is due rather to a poison excreted by the germs during their growth, which, being poured into the blood, circulates through the body, producing general illness. Without the entrance into the body of these germs—tubercle bacilli as they are called—there can be no tuberculosis. Many other diseases are caused by micro-organisms getting into the body ; some of them are quite familiar to you. Practically speaking, all the acute infectious fevers common in childhood are due to the entrance into the body and the develop-

ment there of some micro-organism. All these germs have not been isolated, but the tubercle bacilli can be grown outside the body and its life-history observed.

A test-tube containing some gelatine is sterilized by heat. It is heated to such a temperature that no living thing could remain alive. Then a little piece of phlegm, coughed up by a consumptive individual, is rubbed along the gelatine surface; the tube is then stoppered by some cotton-wool, put into a warm chamber, and the result is a growth on the surface of the gelatine in the form of little scales and a few lumps of brownish-greyish material. Those little lumps, those scales, are made up of millions of the little germs or tubercle bacilli.

The tubercle bacillus is a very minute rod-shaped thing, one ten thousandth part of an inch in length, and less than a quarter of that in breadth. Wherever a person is affected with this disease, tuberculosis, some of those germs have got into the body from outside. The disease affects not only human beings but also some animals. The majority of animals if living under conditions which favour the growth of these germs may become tuberculous. Animals kept in confinement are more likely to become tuberculous than animals that are living free, roaming in the open air; thus sheep, goats, and similar animals that wander about hillsides and fields

are rarely affected. Cattle are often affected with tuberculosis, particularly those which are stalled for dairy purposes, and the milk of these cattle may be infective. There may be slight differences between the germ found in the human body and the germ found in the animal, but the difference is not much greater than that between the slum-grown child of London and a robust country child who has been living out of doors and may be twice the size and a much better colour than the London child—there is not much more difference than that, but still there are differences. The important point is that the disease can be communicated from animals to man and from man to animals.

The chief sources (illustrated by slides exhibited on the screen) are first of all the phlegm coughed up by the consumptive individual, and secondly, the milk of a tuberculous cow.

The phlegm of a consumptive, expectorated on the ground or floor or where it can dry, gets powdered, and the fine material gets blown about in the air and reaches people's lungs; thus infection is accomplished through the air. So also milk from tuberculous cows, if taken as food, may infect the individual with germs. It is children especially who drink large quantities of milk, and bovine tubercle bacilli—the kind that comes from cow's milk—are found very largely in tuberculosis as it affects the young child.

One of the measures of prevention is to get the consumptive so to manage the expectoration that comes from the diseased lung that it shall not be a danger to other people. That is the reason why there is posted up in all sorts of places "Do not spit." The habit of promiscuous expectoration has diminished considerably in the last few years, but it has not altogether gone out. The consumptive who coughs up phlegm and expectorates it where it can rest and get dry is a danger to the community. On the other hand, if a person learns to shield his mouth when he coughs so that there is no splutter from the phlegm into the air, and receives the phlegm into a handkerchief or rag that can be burnt soon after, or expectorates it into a flask where it can be kept moist and prevented from drying until it can be taken and burnt or otherwise destroyed—that person is practically no danger to anybody. The feeling that has been rather prevalent during the last few years that the consumptive person is so great a danger that one had better cross the road and get out of his way rather than risk meeting him is quite a mistake; the disease is not so infectious. The danger is not so much from people met in the street or come across casually, as from a consumptive member of the family living in close communication with other members, especially in a room where several persons have to live, and

perhaps sleep even in the same bed. Tuberculosis is mostly a disease of the home, and not so much of the school or workroom.

The other source of infection is milk, and there we need not worry, because if milk is heated to the temperature of boiling water—not necessarily boiling the milk, but heating it to the temperature of boiling water—keeping it at that heat for ten or fifteen minutes will destroy the life of any germ in the milk, and it may be used with perfect safety. All danger through milk is removed if it is thus sterilized before being given to the child to drink.

It is found that something like 80 per cent. or more of the children under the age of fifteen show signs of having been infected with tubercle germs, and yet only about 10 per cent. of the children in a school will be found to show any signs whatever that they have got tuberculosis. Even of these a large proportion recover. The majority of the children who get infected recover, and a very large proportion of them never show they have been infected at all. The germ gets in but does not do any harm, does not produce disease. This is a very hopeful point when considering the question of prevention, because if the reason is discovered why the majority recover, why some do not, why some get the germs and do not get ill and others catch the germs and do get ill, the way may be found to make all children insusceptible.

Human beings, except for the first year of their lives, are not by any means good hosts for the tubercle germ. The majority probably take in germs and do not suffer. In order to produce tuberculosis the germ has to get into the body, but to do any harm the body must be in a susceptible condition. Broadly speaking, lowering the general tone of health makes the person more susceptible to infection. Anything which diminishes the general vitality of the individual makes him more susceptible to infection and liable to suffer. Children living under the conditions of many of the poorer children in London are in a susceptible condition, because their health is never particularly good, and with want of fresh air and want of proper food and want of general care their vitality is low, so that if they get germs into the body, the germs are likely to find suitable soil on which to flourish. Thus predisposition is the keynote. All living things, all living seeds, require proper soil in order that they may develop. For a particular seed the proper soil is wanted, otherwise the plant is likely to be poor, whereas if the seeds are put in a suitable soil a good crop results. It is the same with the seeds of tuberculosis. Getting into a soil which is not suitable for them, they may die out for want of proper nutriment. If they get into a soil adapted to them, then they flourish and the disease flourishes with them. Those

children I spoke about are unmistakably susceptible.

Some slides shown on the screen show how the germs get into the bodies of these individuals. A consumptive may expectorate, and the material dry on the floor, become pulverized, and as dust enter the lungs; or again, a consumptive may cough minute droplets, as in what is called a "dry cough," which may be inhaled and infect another person or the droplets may infect food. Similarly flies may carry infection on their feet, to food, to milk, or to the teat of a child's bottle. The comforter falling on the floor may be the means of carrying infection to a child in the adhering dust.

What happens when germs taken in by the breath or by food get into the body? If the person is robust and his tissues in full activity, it is probable that the germs get killed by the living cells of the body before they can do particular harm. In the tonsils, and the tissue at the back of the nose called the adenoid tissue, there is a special safeguarding apparatus for filtering off the germs, so that when taken into the mouth by food or clinging to the moist surface of the tonsils, they cannot get into the body tissues without passing through the tonsils or adenoid structures, and these are simply filters for germs. They are composed of a network of fibres with the meshes of the network packed

full of living cells, so that as the germs try to work their way through the tissue they have to pass innumerable cells which attack them, and in the majority of cases succeed in consuming them before they pass through this guarding stratum of adenoid material. But very often the fight between the cells in the tonsils and adenoid tissues and the germs, tubercle or otherwise, which have got in is a severe one, with the result that the protective tissues show signs of the combat, and the tonsils become red, painful, and swollen. When you see a person with sore throat the chances are that some germs—they may not be tubercle germs, but some sort of germs—have got through into the tonsils, and that these organs are suffering from the severe fight that has taken place. After a time, no doubt, the tonsils settle down again, having got the best of it ; but they may not get the best of it, and then the individual gets quinsy and abscesses form in the tonsils; or a child may suffer from chronically enlarged tonsils, which may be caused through the tonsils being constantly engaged in killing off the germs. Fortunately, in most cases disease germs or the germs of dirt of all sorts, do get killed, but unfortunately the tonsils and adenoid tissue get damaged in this fight, not necessarily against disease germs but the germs that can be found in all dirty air. When the tonsils or adenoid tissues have been damaged by

these constant fights, they cannot prevent the tubercle germs from passing through ; they cannot cope with them, and some get through, and when they get through they get into the glands that run down the neck. Then the fight goes on again in those glands. The result we all know because we can see the glands getting painful and enlarged; abscesses may be formed and possibly burst, leaving a permanent scar. Fortunately, in a large number of cases, although the glands have got damaged and even destroyed by the fight, they have at last also succeeded in destroying the enemy, and so protected the person from getting the general infection of tuberculosis, but the danger of this wider infection has been considerable.

In children this glandular tissue—the tissue of the lymphatic glands—is always particularly active, and thus we find these glands frequently affected in children ; tuberculosis of the glands of the neck forms a very large proportion of the tuberculous defects from which they ultimately recover. Enlarged glands in a child should always be examined carefully to find out whether amongst the germs which may have been the cause of the enlargement or abscess the tubercle germ is possibly one. If the mucous membrane at the back of the mouth (the pharynx) has not retained all the germs, some may be breathed down into the lung, get a lodgment there, and

cause tuberculosis of the lung, or as we call it "consumption." A child who has general tuberculosis has the lungs affected in common with other parts, but the disease commencing in the lungs is not as common in children as in grown-up people. Consumption in children is not expected until they get to the age of twelve or fourteen. The lymphatic glands at the root of the lungs frequently become affected in children; fortunately, here again the affection of the glands may be the only sign of disease, and although these enlarged tuberculous glands produce a little general illness, and also may produce some cough, yet the child recovers without getting the lungs permanently damaged.

Infection by food may be caused by the child swallowing infected milk, or its food may be infected through dirty hands. The child, for example, who has dirty nails or scrapes on the floor with its hands may get dirt on the hands in which are some tubercle germs from those deposited on the floor by the careless consumptive; then, sucking the fingers or using the fingers to eat bread or other food, these germs get sucked off and swallowed with the food. In children the lining membrane of the digestive canal—the mucous membrane—is more easily affected by disease germs than it is in adult life. Adults can probably swallow a great deal of tuberculous milk and not suffer; so long as the mucous

membrane is intact and not damaged by ulceration, the germs do not get into the body through the intestinal canal. But in children, before the mucous membrane gets as hard as it is later, there is serious risk that germs may pass through the mucous membrane and so reach the internal organs. Here again there are protective glands, the abdominal glands. Infection by food may cause tuberculosis of the bowel itself, or tuberculosis of the glands. If the germs pass the glands, they may be carried onwards and thus set up tuberculosis in almost any organs of the body. Getting into the blood-stream, the germs may be carried to almost any part ; it then depends on some local circumstances as to whether or where they develop. Tubercle germs may get into the blood, but finding no place where they can settle and develop, may gradually disappear. On the other hand, some little accident—a blow or a twisted ankle, a fall on the knees, or any sort of accident, especially to a joint—may furnish the circumstances required, creating at the injured spot a suitable soil for the growth of the germs. In the damaged knee or hip the germs flowing through the blood find what they want, and a diseased joint results. Children are frequently affected with hip-joint disease, or disease of the bones of the spine. In most cases, we shall be told it is not tuberculosis at all, but that the disease is merely the result of an accident—such

as the child being dropped when it was young. But it was not the fall or the blow alone that made the child tuberculous; this produced the condition in that part which allowed the germs already in the body to settle down. It was the determining factor of the tuberculosis in the spine or joint, although not actually the cause. The actual cause was the entrance of some germs into the body, possibly some considerable time before the accident.

When the germs get into the spongy lung tissues the first change is that the lung becomes solidified, and then the solid material which has replaced the spongy lung breaks down and forms a sort of abscess. In the first place, of course, this solidification prevents any air getting into that part, and the lung, therefore, is useless for breathing purposes. In the second place, with the gradual extension of the disease, the air-tubes are broken into and the broken-down material from the abscess in the lung may be coughed out, and the phlegm will contain germs from this focus in the lung. The effect is first to cause solidification, and then there follows some abscess formation, which may open into the air-tubes. Similarly bone or cartilage of a joint may be affected. As the result of tuberculosis there is breaking down of the tissues, with changes of shape or deformities produced. As seen in the spine the result is a permanent hunch-

back from the breaking down of these bones by the weight of the body, the child becoming stunted and hunchbacked. In hip disease the foot on the diseased side is often much raised from the ground, and the whole limb shortened as a result of the breaking down of the hip-joint. So that much damage may be done even when the child recovers from the disease. This crippling results from tuberculous disease of the bones and joints.

To prevent the spread of tuberculosis the consumptive individual must so manage the phlegm that is coughed up as a necessary result of the disease that it is not dangerous to other people. That is one of the great things that consumptives are taught when they go to a sanatorium or an institution for the special treatment of the disease. How far they carry out the instructions when they get home depends largely on those who have to look after them and remind them. That is one of the first requirements for prevention. The next thing is the management of the milk, which can be made perfectly safe by boiling for ten minutes or so in a milk saucepan before being drunk. But the majority of people in large cities probably take the germs into their bodies sooner or later—it has even been said that 80 per cent. of the children under the age of fifteen have already been infected. Since in large cities tubercle germs are nearly everywhere

it must be almost impossible to stop infection. It is therefore important to endeavour so to improve the health of the people that they are able to resist infection. If people are insusceptible, it does not so much matter if they breathe in or swallow the germs. Fortunately, the majority are healthy enough to withstand attacks, and it ought to be possible to strengthen the remainder of the community to an equal extent; for this we must begin with the children. If the child has got into a low state of health, it is difficult to pick it up again. If that debility comes during the developing period of the child, whilst its bones are growing and all parts are developing, it is difficult to get thoroughly strong again. But if a child can be kept healthy during the period of growth and development, there is no need for fear as to what is going to happen afterwards to the individual. The best way to prevent tuberculosis is to start with the children and strengthen them.

And the requirements are: a plentiful supply of fresh air, an ample supply of proper food, cleanliness, exercise, proper proportions of rest and work—attention to all those things which have sometimes been called the laws of health. In the practical application of these rules there is difficulty from want of hygiene in the homes of a large proportion of these children. The keynote to the prevention of tuberculosis is

cleanliness—cleanliness of the body and of the clothing and of the house. Attention to cleanliness prevents germs remaining if they get on the clothing, floors, or fingers ; they are moved off at once by proper cleansing. There is also wanted cleanliness of the air, which means keeping it as pure as possible, preventing it being fouled by the breath or phlegm of individuals and by other impurities which may be present in a living-room. To ensure this cleanliness the room has to be thoroughly ventilated, so that the air is changed as frequently as possible. The cult of the open window is one of the most important things in this respect. It is better still for a person to live out of doors than to get fresh air from a window, for outside there is not the same risk from dust. An open-air life is the thing to be aimed at. The more a child spends its time in the open air the better it will be ; and open-air schools, which are cropping up here and there, will soon become much more general, for they are extremely valuable. It is said that the open-air school, as it is called, where a child is in the open air during school hours and spends the rest of the twenty-four hours in a close and perhaps not very clean home, is of very little good when the child has already become tuberculous ; but undoubtedly for the child that has not yet become infected the open-air day-school will do a great deal to strengthen the resisting

power and prevent the child from becoming tuberculous. We have made the mistake so far of utilizing open-air schools for the tuberculous child or the child that is thought to be tuberculous or sufficiently ill that it is probably already infected. What we want to do is to use the open-air school to *prevent* the child getting tuberculous. Every school ought to be more or less an open-air school. Most of us know that many schools are nothing of the sort, and in this teachers are very much at fault. When I used to visit the schools I found in many rooms a slate on the top of the Tobin's tube, and perhaps a plant on the top of that to prevent the slate being removed. In most cases the tube was closed before the class came in, with the result that the ventilation was imperfect ; open windows were not common except in the summer-time.

Frequently—especially in the winter—as soon as the teachers and scholars have left the building all the windows are closed. There are two special reasons for this; one is that when the sweeping takes place it is done by people who do not like draughts, and the other is that if the rooms have to reach a certain temperature by the time the children assemble in the morning it does not do to get the rooms too cold in the evenings or the fires must be lighted a good deal earlier in the morning. One way of keeping the rooms warm is to keep the windows shut

till the pupils come in the morning. I remember being much struck in a certain school. In one classroom the teacher complained that the children were dull and wanted to sleep rather than listen to the lessons. I was not at all surprised when I looked at the means of ventilation—they were all shut up. But in the classroom next to it there was no complaint about drowsiness and dullness ; one could see the difference in the appearance of the children, and in this room the windows were all wide open. This was explained by the teacher, who said she had a sister who had been sent to a sanatorium, and when she returned could not stand any window being shut. As a result, her sister also began to like open windows, and could not stand them shut ; so when she got to school she always threw the windows wide open. The children, improved by this, were alert at their work, and all did better than those in the stuffy room next door. You can multiply instances like that by the hundred as one goes about the schools. But better still, when the weather will allow, is to have the classes held out of doors.

For the tuberculous children residential schools are wanted out in the country or at the seaside. The majority of us have to part with our children at some time, perhaps for nine months of the year, in order to send them away to school, and the working classes can part with their children

equally well with no great hardship. I think it would be a benefit very often to both mothers and children if that did happen. In these residential schools the children live under hygienic conditions, except during the holidays when they go back home. But in those nine months at school they will get a stock of strength that will help to carry them through their holidays, and should have an influence at home by teaching there some of the things learned at school and possibly improving the condition of the homes.

There are several open-air schools already near London. In other countries also we may find the same sort of thing. The Paris Municipality, for example, has a large institution at the seaside where the children are cared for and taught. These residential schools are wanted for children who have become tuberculous; but many can be prevented becoming tuberculous by looking to the proper hygienic management of the day-schools and seeing that at least while they are at school the children get all the fresh air that is possible.

This open-air life should be carried out for children suffering from hip disease and tuberculosis of the joints and bones. They spend the day out of doors, and sometimes sleep out of doors or in rooms such as are seen in sanatoria, which are practically open-air rooms, with both sides open so that the wind can play on the

children while they are asleep as well as during the day. The open-air schools give the children better appetites, and these increased appetites must be satisfied. It is no good making them hungry and letting them go home with nothing to eat. That is another reason why the open-air day-school is not so good as the institution where the children can live all together till they are well.

[The lecturer, having exhibited a number of slides illustrative of various points, said]: —

To sum up, there is an immense amount of tuberculosis in every crowded community, and especially in the densely populated centres, like London. The infection frequently affects children, and, according to some authorities, all tuberculosis in adults is contracted in childhood. The disease can be prevented, especially by looking after the health of the children so that they become resistant to the germs. Therefore it is worth while to look after the health of young children, see that they get as much fresh air as possible, and live under hygienic rules. In this way a large proportion of those who otherwise might suffer from tuberculosis hereafter will be safeguarded by being strengthened, so that their resisting powers may be sufficient to enable them to cope with the germs of tuberculosis which, unfortunately, frequently get into the body in any large city.

INFECTION IN AND OUT OF SCHOOL

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INFECTION in and out of school is a subject of the greatest importance to both the health officer and the teacher. The former regards infectious diseases as preventable, and therefore attempts, by such means as are within his power, to prevent them. According to the success or failure of his efforts, so are there in his district varying rates of sickness which have an immediate effect on the mortality returns and a distant effect on the health of survivors, some of whom are physically crippled as a consequence of the sequelæ of these diseases. To the teacher, infectious diseases are a source of continual anxiety and annoyance. Their prevalence interferes with the daily routine of teaching, intellectual progress is hindered, and after an epidemic some children are permanently lowered both in physical and mental vigour.

A proper appreciation of the subject necessitates an acquaintance with the nature of infectious diseases, their method of spread, and the natural

history of the infection. Granted knowledge of these points, preventive measures may be devised which will limit the spread of contagion and diminish the damaging effects of attack.

An infectious disease results from the invasion of the system by particulate bodies known as micro-organisms. Each disease has a specific infection ; that is, the same disease always results from infection by the same organism. In favourable circumstances infection may be transferred from the sick person to a healthy one. The diseases pass through certain stages in which characteristic symptoms develop. Each disease likewise possesses certain peculiarities as regards its method of extension.

A micro-organism is a minute single-celled piece of protoplasm. There are different types, and they may be regarded as consisting of three groups : bacteria, a low form of vegetable life ; protozoa, a low form of animal life ; and others of doubtful classification which consist of particles so small that they are capable of passing through the pores of such filters as the Berkefeldt and unglazed porcelain Chamberland. Present knowledge of this class of organism is somewhat limited, but is rapidly increasing.

Bacteria assume various shapes, such as minute spherical cocci, rod-shaped bacilli, slender, wavy threads or spirilla, and the long branched or unbranched thread forms of certain higher

bacteria. The protozoal organisms are not of great interest to us, so they may be passed over with the brief reference that they are the agents responsible for such diseases as certain forms of dysentery, malaria, and sleeping sickness. The infectious diseases as they are met with in schools belong generally to the other two groups.

Bacteria multiply either by dividing into two (fission) or by the production of spores. These spores are highly refractile bodies which are very resistant to chemicals and to temperatures below 100° C. It is therefore obvious that if this spore-forming character were an invariable tendency of micro-organisms, infectious diseases would be more difficult to control than they are. Fortunately that is not the case. Fission is the more general method of development, and as it proceeds rapidly, organisms increase in considerable numbers in a short time. The higher thread-like organisms (*leptothrix* and *streptothrix*) reproduce themselves by forming specialized bodies, known as conidia, at the free ends of the threads. Speaking generally and in contrast to the resistance which spores show to destructive agencies, these bacteria are not very resistant. Sunshine, fresh air, desiccation, chemicals, and heat are fatal to them.

The filterable organisms, which are generally known as ultra-microscopic, though they are not all ultra-microscopic in the several stages of their

existence, are regarded as giving rise among other diseases to typhus fever, smallpox, measles, scarlet fever, and mumps. They are destroyed by heating to 50-70° C. for ten minutes. They survive drying and resist the action of glycerine. It is interesting to note that many of these filterable organisms are spread by means of intermediate agencies such as insects. For example, the infection of yellow fever is transmitted by a mosquito and typhus fever by the body louse.

We must therefore regard infection as a living particulate body which can be recognized by means of the microscope in many instances. The presence of ultra-microscopic organisms is capable of proof in other ways. The infective particles may gain access to the body either by being breathed in, by being swallowed, or by inoculation through the skin. Inhalation requires, of course, that the infective particle shall be conveyed by the air. The air may be infected by the small moist globules of mucus or sputum which are given off when the patient coughs, or even talks, when suffering from smallpox, chicken-pox, diphtheria, scarlet fever, measles, mumps, whooping-cough, or influenza. Dust may also be infected as certain organisms such as scarlet fever and the tubercle bacillus resist desiccation. Air may therefore contain infection when such contaminated dust is raised.

Germs may be swallowed in infected food or

drink, as when water is contaminated with the infected materials of enteric fever or cholera. Milk may receive similar infections, and also such as scarlet fever from the hands of an infected milker. Shellfish and vegetables are polluted by sewage contamination. Disease as a result of inoculation may follow a scratch or wound, or, as already stated, an insect bite.

In schools the common methods of extension are by the breathing of air infected by a patient already suffering from the disease, by children kissing, by the common use of school requirements such as pencils, by the dried vomit of an infected child being ground up and becoming air-borne, and by infected sewing and infected books dispersing any infection which may have been transmitted to them.

Immunity.

Immunity is the power which the body possesses of resisting the onslaught of infective organisms. Some of the contributing agencies are as yet only imperfectly understood, but the value of others is obvious. The skin and lining membranes of the various tracts, respiratory and digestive, present a physical barrier, the value of which is lessened by injury, particularly when it results in a break in continuity. When organisms enter the tissues, the white blood corpuscles, the cellular elements which form the connective tissue, and

the lining membrane of the arteries take a part in repelling the invader either by direct attack in which they absorb the organism into their own substance, or by the elaboration of chemical products which are antagonistic to its welfare. The unborn child inherits some of these chemical substances from its mother, others it elaborates for itself at a later age as a result of experience. This experience is usually gained by being attacked and passing through the illness, and the changes in the blood which result enable the individual successfully to resist further attacks of the same nature. This power varies in persistence. After such diseases as smallpox, scarlet fever, whooping-cough, and measles resistance lasts practically a lifetime, and second attacks are therefore rare; on the other hand, the protection resulting from an attack of influenza, pneumonia (an infectious disease due to the *pneumococcus*), or coryza (a common catarrhal cold) is slight.

Immunity is moreover a relative term, and it may also be complete or partial. For example, in the earliest cases of an influenza epidemic the infection may have only a low power of producing disease, and as a consequence those who are attacked suffer distinctly less than later patients who may be infected after the organism has gained increased virulence, which follows the passage of the bacillus through different hosts; similarly an organism of the same strain may produce disease

in two different persons with marked difference in symptoms, one being a mild attack and the other severe. This is individual immunity. Individual immunity is assisted by maintaining the body in a state of good health, and to this extent the hygiene of schools and homes, particularly in matters affecting lighting, ventilation, cleanliness, and avoidance of overcrowding, is important as a means. There is also race immunity, as, for example, in yellow fever. The inhabitants of a district where this disease is usually found suffer less severely than new-comers ; also tuberculosis, the white man's plague, becomes severely epidemic when introduced into new countries which are being opened up to colonization. Measles acts similarly. Other diseases, such as hog cholera and chicken cholera, never attack man, nor do the lower animals suffer from whooping-cough or measles. Other diseases, however, attack both man and certain animals—for example, tuberculosis, anthrax, and glanders. After an attack of measles, whooping-cough, or influenza, although immunity against second attacks of these diseases is conferred, the resistance of the body to an attack of broncho-pneumonia or tuberculosis is lessened possibly as a result of alterations in the mucous membrane lining the air-passage.

Immunity therefore may be natural or acquired. The acquired form follows an attack, but it may also be experimentally conferred. Immunity from

smallpox, of varying duration, results from vaccination with the attenuated virus of smallpox ; this may be regarded as a typical example of experimentally conferred immunity.

It is generally believed that the infection of smallpox and vaccinia—that is, the condition resulting from vaccination—are the same, but the smallpox virus has been attenuated by passage through the cow. Again, vaccines which are prepared from dead organisms are useful as protective agents against plague, cholera, or typhoid, and finally, inoculation with anti-toxin will, in the case of diphtheria, also confer immunity. Anti-toxins are the antidotes to the toxins which micro-organisms produce during their sojourn in the human body. These toxins are poisonous, and it is to their presence that the fatal results in diphtheria are due. They stimulate the tissues to produce a neutralizing body. The antitoxin used in diphtheria is produced by certain special means, and is used as a curative agent when children are affected with the disease, and as a prophylactic or preventive agent in the case of contacts. Small doses injected into contacts enable them to deal with the infection in an early stage if it should have been their misfortune to receive infection.

The Development of an Infectious Disease.

After a patient has been infected, the organism proceeds to multiply in the patient's body until

poisons are liberated. No symptoms, or only very slight ones, are observed during this stage, which is termed "the incubation period." This period varies with different diseases, and these will be set out later. The incubation period terminates with the stage of invasion, and this is characterized by the onset of certain symptoms. From this point the disease runs its course and continues to develop; finally, if the patient survives it arrives at the stage of defervescence, when the symptoms abate and the patient becomes convalescent. The symptoms vary according to the different diseases, but certain are common to all; for example, the temperature rises, there is generally a shivering fit or rigor, often the patient complains of headache, and there may be some sickness. Other symptoms dependent upon the nature of the disease develop. Thus catarrh affects the mucous membranes of the eyes, nose, throat, and lungs in measles, bronchial catarrh is a feature of whooping-cough, sore throat of scarlet fever and diphtheria, diarrhœa is prominent in enteric or typhoid fever, and severe backache in smallpox, and so on. Some of the diseases, known as the exanthemata, also develop a characteristic skin rash. Although there may be some doubt as to whether a patient is infectious during the incubation stage, there is no doubt that with the onset of symptoms infectivity is established, and in some instances—for

example, measles—the early catarrhal stages are probably the most infectious. In those associated with rash, changes are produced in the skin which result in the shedding of the superficial layers either as a consequence of excessive proliferation or of actual destruction of the skin tissue, and this changed skin is assumed, and rightly so in some instances, to contain infection. The state of defervescence probably indicates the success of the cellular elements of the body over the micro-organisms, and sooner or later these latter are destroyed. In certain instances, however, the organisms appear to be able to adapt themselves to the altered conditions in their host, and to continue to develop for a longer period than that of convalescence. Examples of diseases in which this is noted are scarlet fever, diphtheria, and enteric fever, and it is this adaptability which enables organisms to continue to be released from the convalescent's system which gives rise to the frequent occurrence of "return" cases. The word "return" has reference to the fact that a patient has been to hospital, and although discharged convalescent, has since been found capable of transferring the infection to a healthy child. They are also known as "discharge" cases and "carrier" cases, the term "carrier" indicating that the convalescent is still a carrier of the particular infection which gave rise to the disease from which he suffered. Some persons are

carriers though they have not been known to suffer from an attack. This has been observed in diphtheria and enteric fever.

The difficulties associated with discharge cases are real, as the following example in my own experience will show. Some few years ago I had to deal with an epidemic of smallpox, and the fever hospital which usually accommodated all cases of infectious disease was given over entirely to the treatment of smallpox cases. A young boy aged about nine years was admitted, and having passed through an attack of moderate severity, was well on the way to complete convalescence. In some unfortunate manner he got hold of a book which it was known had been used by scarlet fever cases some months before. He sickened with this disease, and was removed for treatment to an isolation ward which was roomy enough to accommodate four patients. This ward had never been used for scarlet fever cases, and the nurses in charge had not been near such patients for months, neither had any been treated on the hospital site for the same period. The attack was mild and uncomplicated, and after complete desquamation he was passed through the special discharge block and sent home. The whole of the clothing which he had used in the hospital was destroyed and an entirely new outfit was brought from his home. As stated, he never had a complication, and the attack was

mild. The ward in which he had been treated had over eight thousand cubic feet capacity, so there was no suspicion of overcrowding. When he arrived home he slept with an adult who had been treated for smallpox at the same time that he had been, but who had been discharged shortly after he sickened with scarlet fever. In three days this adult sickened with scarlet fever, and the following day another child went down with the same disease. Circumstances could not more strongly suggest the transference of infection from the convalescent. The weak point is that the two cases might have been infected outside, but careful inquiries were made and failed to give support to the suggestion. This is the best illustration in my experience of the risk of infection from convalescent patients, notwithstanding the exercise of every known precaution.

Another class of case which creates difficulty is the atypical case. Some patients suffer from such a mild attack that the symptoms are either non-existent or so slight that they pass practically unnoticed, and the transient illness is regarded by parents as being due to a slight chill or to temporary disturbance of the digestive tract.

Given foci of infection, it is clear that schools must help in the dispersion of infection. Stress is often laid on infected pencils, sewing, books, and so on. These, it is true, constitute a risk,

but they more frequently affect the single scholar who, of course, may be the starting-point of an extensive epidemic. The infected child, however, may, and frequently does, infect more than one, and this source of infection is the more important. In schools the air is in movement, but the range of such movement is limited, and as a consequence the presence of a child giving off infection results in increasing concentration and therefore increasing risk; in the open air, on the contrary, contact with an infectious disease causes only a few cases, and this is due to the air-currents rapidly diluting the infection and therefore lessening the risk. The risk even outside is increased by close contact, the maximum probably being reached in the act of kissing. School infection, therefore, is operative in a manner similar to home infection in the same circumstances, but the results are obviously wider spread, owing to the difference in the number of children in the room. I have emphasized the above point somewhat, as my action in investigating outbreaks has always been to avoid overlooking infected children, even if other minor causes have been obviously at work.

Classification.—These infectious diseases are also known as zymotics. Smallpox, scarlet fever, diphtheria, enteric fever, measles, whooping-cough, and diarrhœa are the seven principal zymotic diseases. Of these, the last

named does not concern us. Further grouping is into notifiable and non-notifiable diseases, the notifiable being those which must be notified to the local authority. The first six mentioned are included in this category, as well as tuberculosis, cerebro-spinal meningitis or spotted fever, and anterior poliomyelitis (infantile paralysis). Measles and German measles have only recently been added to the list. Chicken-pox, whooping-cough, and mumps, diseases of interest to the school teacher, are non-notifiable. The majority of the above diseases each require separate consideration.

Measles.—This disease has an incubation period of nine or ten days, at the end of which interval the initial symptoms develop. These consist of injection and watering of the eyes and a catarrhal condition of the nose and upper respiratory tract. There is very little to distinguish the attack from that of an ordinary running cold. At the end of three days a rash begins to show, as a rule on the forehead and cheeks, gradually extending to the whole body. The rash consists of dull pink-covered spots, slightly raised, which are at first quite distinct and separate, but they may ultimately coalesce. The mucous membrane of the mouth, particularly about the lips and gums, shows small dark red spots just before the rash appears, and these help in the diagnosis of early cases. The disease is ushered in with

headache, feverishness, and occasionally a chill and vomiting. The rash begins to fade in a few days, and a fine desquamation of the skin ensues. Bronchial catarrh is a frequently associated symptom. In uncomplicated cases the child makes a rapid recovery after the decline of the rash, but complicated cases, chiefly the result of lung affection, may prolong convalescence or even cause death.

The chief matters of interest from the school teacher's point of view are as follows: The first case in a district is generally not recognized until the rash appears. This is unfortunate, as the disease is probably most infectious in the catarrhal stage. Few people who are unprotected by a previous attack escape infection if exposed to it. Epidemics occur every two or three years, which chiefly affect the young and unprotected. This results in the disease principally affecting infants' departments, as the seniors are mostly protected by a previous attack. The infection is probably of low resistance, and very little advantage results from disinfection. Infection carried by means of a third person is rare. Second attacks are comparatively rare ; in many so-called second attacks either the first or second is wrongly diagnosed, measles being mistaken for German measles or even scarlet fever. I have no experience of any return cases of measles, and probably there is fairly early freedom from infection.

As regards school action, a child suffering from the disease should be excluded from school until at least three weeks after sickening. Children attending the infants' department of a school should be excluded for about three weeks after the last patient sickened if they reside in the same house as the patient. Children who attend the upper department may continue in attendance if they have already suffered from the disease, even whilst a patient is under treatment at their home, but those who have not suffered should be excluded for about three weeks after the commencement of the last case. A contact, whether attending an infants' department or being a senior who has not previously suffered, if placed outside the possibility of infection should be excluded for sixteen days.

School closure is not often successful as generally carried out. Closure is frequently practised after the majority of the children have been infected, and on reopening the school the disease does not cause any trouble. This is due rather to the exhaustion of susceptible material than to spread of infection being avoided.

The sequence of events in a school in a measles outbreak is somewhat on these lines: A child sickens. The early infectious catarrh is mistaken for cold until the rash appears. The patient is kept at home, and perhaps the teacher is not informed of the circumstances. Several other

children have been infected, and in ten days they attend with commencing catarrhal symptoms and infect a considerable number of the unprotected, who likewise sicken on the succeeding tenth day. School closure, as stated, does no good at that stage.

A more rational course to adopt—though I must confess that it has frequently been unsuccessful in my own experience, owing chiefly to infection received out of school which upsets all calculations—is to close the class in which a case has occurred from the evening of the eighth day after the child *first* attended school with catarrhal symptoms to the morning of the fourteenth day after the patient last attended and was recognized by the rash as suffering from measles. In this interval the children already infected will sicken. The parents of all the children in that class should receive a printed form calling their attention to the reason for closure and informing them that children with running colds in the head or even with any slight illness should not resume attendance until it has been ascertained that they are not suffering from measles.

A register showing from what infectious illnesses a child has suffered is a useful record to keep, but information obtained from the parent on admission of a scholar is generally unreliable. The subsequent entries, however, are more

reliable, as they will be based on inquiries made at the time of the illness.

German Measles.—German measles is generally a mild disease, but very infectious. It is characterized by the appearance of a rash, which may assume the characters of either scarlet fever or measles. It is not generally serious. Its chief importance lies in the fact that it is frequently mistaken for ordinary measles or for scarlet fever. The incubation period is fourteen days, and children should be excluded for about three weeks. Children from infected houses attending the infants' department should likewise be excluded for fourteen days, and a senior only if he has not previously suffered from the disease. Where quarantine is practised about twenty days will suffice.

With the decline of the rash in this disease a fine desquamation follows. This never assumes the extensive character of scarlet fever, and where it occurs on the hands and feet the desquamating skin seems very much thinner than similar desquamation in scarlet fever. I have never seen the skin shed with the castlike character of skin in scarlet fever. It is generally more like a little pin-point opening, giving the appearance of a ragged cuticle, which is very thin.

Whooping-cough.—The incubation period of whooping-cough is ten to fifteen days. At the end of that interval an irritable cough develops,

and the characteristic symptoms are fully established in another fourteen days. These consist of a series of peculiar sharp coughs, followed by a deep inspiratory stridor. The paroxysms come on at indefinite times, and the child may appear well in the interval. After the spasmodic cough has ceased to trouble the patient a catarrhal cough of varying severity remains. The disease should be dealt with generally on the lines advocated for measles. A somewhat more prolonged period of exclusion of contacts, say twenty-one days, should, however, be required.

Scarlet Fever.—This disease has an incubation period of from two to four days. The onset is sudden, and in addition to the usual febrile symptoms, vomiting is often noticed. The rash appears in about twenty-four hours after onset. Sore throat is always an early symptom.

Outbreaks of scarlet fever are liable to cause considerable trouble. The origin is often difficult to discover, owing to the frequent association of atypical and carrier cases. During an epidemic all children vomiting in the school should be noted, and every child complaining of sore throat should be suspected. In tracing the cause of an outbreak, registers should be carefully examined and absences due to illness, even if only for a day, should be investigated. The disease at first may show a certain incidence in one class of two or three cases, but it soon

crosses over to other classes. It has not the explosive character of a measles outbreak. The chief precautionary measures at home should be to remove the patient to hospital if possible and safeguard healthy children from infection on the return of the patient by arranging for the convalescent to sleep alone, to have plenty of fresh air, and to avoid kissing other children for at least a fortnight.

In the schools the patients should be excluded until fourteen days after the house has been disinfected, and if the patient has been moved to hospital the convalescent child should be excluded for fourteen days after return. Similarly, children in infected houses should be excluded for fourteen days after disinfection of the premises or after removal of the patient to hospital. The period of quarantine of contacts who have been removed from the source of infection should be eight or ten days.

Diphtheria.—This disease, like scarlet fever, has a short period of incubation. This period is, however, slightly longer, generally being about five days, though it may be as short as three and as long as nine. The onset is characterized by the usual febrile symptoms and sore throat. In the throat a membrane forms which may extend into the nasal passages or downwards into the larynx. It is worth remembering that after attacks of diphtheria patients are liable to

paralysis of the throat, which in severe cases may seriously affect speech or even swallowing. The disease is often persistent in a district and in schools, and tends to spread in spite of the most energetic measures. Again, carrier cases and unrecognized cases increase the difficulty of suppressing outbreaks. During a time of prevalence, children with sore throats, particularly if associated with enlarged glands, should be suspected of suffering from diphtheria, as also should children with an irritating discharge from the nose. It is often necessary to take swabbings from the throat or nose of all children in the class when ordinary exclusion fails to suppress the prevalence. Infected children should be excluded for fourteen days after disinfection of the house or after return from hospital. Children from infected houses should likewise be excluded for fourteen days after disinfection of the house or after removal of the patient to hospital, and contacts should be quarantined for twelve days.

Chicken-pox is a common ailment of childhood, although by no means a serious one. All children suffering from the disease should be excluded, as likewise should others from infected houses if they attend the infants' department. The incubation period is about fourteen days, and a period of between two and three weeks must elapse before an infected child can be regarded as free from infectivity. This stage

is assumed, and probably rightly, to have been reached when all the scabs have fallen off. If contacts are excluded, twenty days' quarantine is necessary.

The disease assumes considerable importance during a period of smallpox prevalence, as it is possible that it may be mistaken for that ailment. In chicken-pox the child sickens, and the rash appears almost simultaneously with the sickening. This rash, at first papular, rapidly becomes vesicular. In only a few cases do the vesicles become purulent. The disease always looks " cheap," compared with smallpox—i.e. the vesicles are thin, poorly formed, not regularly circular, and there may be on the same area a rash which shows a papule, a vesicle, a little purulency, and a scab within a limited area. Most children who are not rendered immune by a previous attack sicken when they come into contact with this disease.

Smallpox.—This is a serious disease amongst unvaccinated persons. Efficiency of vaccination results in increased protection, and as some children have only received a limited amount of protection, it is not an infrequent occurrence to find mild cases of smallpox in the senior classes during an epidemic of this disease. The incubation period is about twelve days. The disease is ushered in with somewhat severe symptoms. Other than the usual febrile conditions, the most

characteristic complaint is that of backache. The subsequent development differs according to whether the child is vaccinated or not. In the former the disease runs a more rapid and generally a milder course. In either case the rash appears at the end of the third day in the form of small pimples. These develop through the stages of vesicle (that is, a watery blister), which later becomes pustular, and ultimately scabs form which fall off during the stages of convalescence, leaving more or less pitting. The disease is most infectious, and I have on several occasions found children with very mild attacks in attendance at school. Although the early symptoms are very pronounced, even in vaccinated smallpox, with the appearance of the rash the patients improve, and so we find that in mild, modified smallpox children with a small amount of rash may resume attendance on the clearance of the initial symptoms, the slight rash being mistaken for blood disturbance or acne. During times of smallpox prevalence the reason for absence of all children should be inquired into, and those which give an account of illness in which feverishness and backache are prominent should be excluded.

Children may return to school soon after discharge from the hospital, and other children from the same house should be excluded for sixteen days after the removal of the patient to hospital

or disinfection of the premises. Contacts who have been removed from the sphere of subsequent infection should be excluded for sixteen days after they were last in contact with the disease.

Mumps.—This is an infectious disease, which is characterized by swelling in the neighbourhood of the parotid gland—above the angle of the jaw. The incubation period is rather a long one, and probably covers three weeks. The duration of the disease varies, and therefore the period of exclusion cannot be definitely stated; but children suffering from the ailment should be excluded until one week after the characteristic swelling has subsided. It is only rarely that serious complications supervene, and as a rule children from infected houses are not excluded from attendance. If, however, it is considered desirable to exclude a contact, a period of twenty-four days is necessary.

Erysipelas is due, as a rule, to septic infection of a wound, though cases arise in which the means of the infection gaining access to the body are not clear. The patient is sufficiently ill to be kept at home. No school action is necessary.

Typhoid fever only very rarely gives rise to difficulty. The disease, as a rule, does not display the same severity of symptoms when it attacks school children as adults. The disease is one which is fairly easily controlled, and as a rule the sanitary authority quickly limits the area

of extension. There is no necessity to arrange for special exclusion of other than infected children. If, however, a child living in a district in which typhoid fever is known to exist suffers from diarrhœa, it would be well to notify the medical officer of health for the district of the fact.

Cerebro-spinal meningitis (spotted fever) and acute *poliomyelitis* (infantile paralysis) are diseases which have recently been made notifiable, and at the present time are receiving considerable attention from sanitarians. The diseases do not follow the course of epidemics of the other diseases. A child may be infected and the rest of the children in the house may escape, but others in the same street or neighbouring streets may sicken, and association with that case may be known or not. The diseases, being serious, are carefully investigated by the medical officer of health for the district, who will outline any special action.

Infection behaves similarly whether in the school or in the home. The difference depends solely upon the special circumstances in which the recognized and carrier cases play a part. In the school the children are massed in rooms which favour the spread of the disease. When under home control children are specially liable to infect other susceptible members of the same household, and by visits to other

homes and association with children in confined spaces, such as places of amusement, tramcars, and the like, they have opportunities of infecting others outside the family circle. In addition careless nursing or control of a recognized case is not infrequently encountered. A patient may be allowed too much freedom, or visitors be permitted to see the patient before convalescence is established or the house has been disinfected after recovery from those diseases which are usually followed by disinfection. Careless nursing is also responsible for much permanent injury which might otherwise be avoided. These effects are mainly seen after attacks of measles and whooping-cough, and to a less degree after mumps. In outbreaks of these diseases in winter or late autumn the prolongation of the catarrhal conditions results in a severe tax upon parents, who are inclined to relax their vigilance. Children take cold, and pneumonia and prolonged illness follow. In the early stages also the diagnosis of a common cold, the seriousness of which condition, in my opinion, is not sufficiently recognized in either home or school, results in careless exposure and the same kind of complication, which is not infrequently fatal.

In schools half-hearted measures frequently prolong an outbreak, and the aggregate loss of attendance is as great as or even greater than when more vigorous measures are adopted from

the start. Temporizing also results in a prolongation of the period of irregularity of attendance, which is not conducive to progress of the pupil or the pleasure of teaching.

Disinfection is generally undertaken at school after outbreaks which suggest that the school or room has been heavily infected. After school closure it is almost universally practised. In the home, disinfection by the sanitary authority is not usually arranged for after measles, whooping-cough, chicken-pox, mumps, or German measles.

The value of disinfection varies distinctly with the process and after-treatment. In most diseases the infection seems to be shortlived, but in others, such as scarlet fever or smallpox, it resists drying for a considerable period, and therefore may linger in living form for a long time in books, papers, dust, and crevices. Instances of outbreaks of these two diseases are recorded which would appear to have resulted from conveyance of infection over long distances, and the period between the article which gave rise to the outbreak being infected and the release of the infection considerable. Measures such as placing a bowl of disinfectant in a room or hanging a curtain moistened in disinfectant at the door of an infected room, though valueless in themselves, are useful as reminders ; and further, the practice of disinfection either in school or home, apart from any intrinsic value, is of service, since it

tends to keep alive the knowledge that these diseases are capable of spreading, and it serves the more practical purpose that rooms cannot be fumigated nor walls sprayed without causing such an upset that a thorough cleansing with soap and water invariably follows. In both schools and homes disinfection should also involve the destruction of useless litter which tends to accumulate. Old books, papers, pieces of sewing, and odds and ends of all descriptions should be searched for and destroyed. The actual disinfection process should always be supervised by a man skilled in the work, and the actual method suited to the circumstances should be decided upon by the Local Authority.

THE CRIPPLE CHILD [1]

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THREE important questions about crippled scholars are, first, Who are these crippled children? secondly, Why should they require any special care apart from hospital—why should they require special national or educational care?—and thirdly, What are the results of any care bestowed upon them? Are the results of worth to the nation apart from the results to the individual children and their parents?

Now, taking the third of these first, as to whether the results of paying a great deal of special care to cripple children are worth while.

An experience at Amalfi, in Italy, can be recalled where, whilst driving down the valley for about a mile, there was a continual stream of beggars and cripples following the carriage; they were begging, and most of them were cripples. It is the same all over Italy, but Amalfi is a great touring place, and tourist places are in-

[1] The Author's duties have prevented his correcting this condensed verbatim report.

fested with cripples, almost every cripple being a beggar. It is because more care is taken of our cripples in England that there are not these numerous destitutes, without education or occupation, and with severe deformities, begging about the streets. This is sufficient to indicate that care of the cripple child is doing a great deal, and that special knowledge amongst the public of what can be done is worth while.

The number of cripples in the country is less than might be expected. In the London schools cripples number something under four thousand out of a school population of six hundred thousand. The number of children who are born cripples is extremely small, although nearly all cripple children have become so comparatively early in life. The cause of the crippling in about 50 per cent. of the cases is tuberculous disease of the bones and joints.

Of the other half of the cripples, a large proportion suffer from results of infantile paralysis, a disease just as much infective as tuberculosis. So that in this country a large proportion of crippling is due to two infections, tuberculosis and infantile paralysis ; now, having reached that discovery, it is naturally hoped that some time in the future we shall manage gradually to lessen or even abolish those great sources of crippledom.

A smaller proportion of crippling is from accident and incidental diseases.

Infantile paralysis, the infectious disease, has its great incidence before the third year of life, from eighteen months up to about three years. Tuberculous disease of the spine, one of the worst forms of crippling, arises in about 70 per cent. of the cases before the age of five years, and this is true of most other tuberculous diseases. So that a large proportion of these children are crippled or get their crippling disease very early in life, many as babies.

A child who has tuberculous disease of the spine may become a little hunchback. But there is no necessity for the child to be a hunchback ; discovered early and properly treated, the child may have had tuberculous disease of the spine in quite a bad form, and yet may have no hunchback—may, indeed, be perfectly upright and comparatively straight. Not every child can recover so well, because children vary in their resistance. Some who get the disease have little resistance, and however well treated, go downhill, eventually dying of tuberculous disease. But there is no reason why those who recover should do so with a deformed spine ; they can be kept straight. The first and most important point to attain that end is very early discovery of the disease. It is extraordinary how the children of the poor are brought to the hospital with a great big knuckle sticking out of the back, which must have been present for months, and which the parents have

never noticed. Now, the knuckle sticking out of the back is the first sign of the development of a hunchback, but it has not been the only sign in the development of the disease or in the origin of the disease. One of the very first things to be learnt in preventing deformity in children is to train the parents to take notice of small, very small troubles in the child in the shape of little peculiarities suddenly developed, peculiarities of walking or peculiarities of playing, described later as early signs of disease.

The second point is treatment; that is a question which is difficult, because it is largely a matter of expense. If these cripple children are to be got as well and as straight as they possibly can, they should be in an institution specially designed for the care of cripples for a period from six months up to three or more years, and they ought not to leave that institution until they are perfectly well and sound. Unfortunately, there are too few of these institutions. There are one or two comparatively large institutions which take children for prolonged periods in this way, such as Sir William Treloar's Home at Alton, or the very fine hospital in connection with Liverpool at Heswell, and other similar institutions. There are many smaller ones where the children are not kept so long, perhaps six months or a year. To get the best results, however, with these cripples, there should eventually

be suitable institutions to which all of them who require long treatment can be taken and kept as long as necessary.

Take the child with a little knuckle on the spine because he has got tuberculous disease; he requires to be placed flat on his back, on a splint, in such a position that the spine is prevented from more bending; and having been put on a splint, the child should be kept in that position for a period which may be anything up to three or four years. It may be as short as six months, but is not likely by the simple method of splinting to be anything less.

Let us take another child who has had an attack of paralysis in his leg, a bad attack, so that he is incapable for the time being of walking; he must be kept on a splint at rest for perhaps six to eight months, to prevent any sort of deformity, to which there is always a tendency. As soon as there is recovery sufficient to enable him to walk he must be allowed or made to walk. Throughout the time he is laid on the splint and when he attempts to walk he requires massage, exercise of the muscles, and treatment by electricity. As soon as it is evident how much loss of muscle will be permanent, an apparatus, splint, or what is commonly called "irons" is necessary to enable him to walk. Think of the cost and individual care to be spent on massage, on electrical treatment, the fitting of the surgical

apparatus, and the training, to enable him to walk. At present, surgeons who are doing this work for children in the London hospitals have to manage as best they can in the out-patient departments, and it means that a large proportion of the treatment is neglected. If the child is brought up regularly to the hospital it may cost a sixpenny fare for the parents three or four times a week in order to get the child there for massage and electrical treatment. It is not possible under those circumstances to get the best results with a paralysed child. There are institutions which are designed specially and entirely for this infantile paralysis. In consequence of an epidemic in Sweden, a special institution was provided with 150 beds for such patients. They are kept there and treated by massage, electricity, and instruments until they are able to walk out of the hospital, or until they have been there sufficiently long for it to be clear that the treatment is doing nothing further towards recovery.

Many children in London have been in institutions for periods ranging from three or four and even up to seven and eight years. It is essential that institutions where children are to remain for periods of from six months up to three and four years should be educational institutions as well as hospitals, like those at Alton, Heswell, and others which are hospital schools ; that is, they are hospitals for the prolonged

treatment of cripple children with school teaching, so far as this can be carried on without interfering with their medical or surgical treatment. Such institutions exist in this country in rather a haphazard way, practically all started and carried on by voluntary effort. Some of them now have assistance from local Councils, or get help through the tuberculosis scheme of the Insurance Act. They are used as institutions for treatment of tuberculosis in children, and to that extent subsidized by county councils or by borough councils.

The immediate requirement of those discharged "cured" after one or more years of treatment is that of continued education. It is not safe for a boy cured, perhaps, of hip disease to go to an ordinary school and to be educated with a lot of other healthy boys. A boy who has once had tuberculous disease of the hip-joint still has the disease there. I remember a physician, perhaps the best known medical teacher of his time, and whose aphorisms are still famous, who said, "Tuberculosis is a disease which is often arrested, seldom cured." That is true; ninety-nine out of a hundred have the disease arrested, but not cured. A boy had been sent to a cripple school, not for tuberculosis of the hip, but because of supposed epilepsy; he had a history of tuberculosis of the hip some three or four years before, but had no signs of it whatever. As medical

officer of the school, I examined the boy, and decided that he had no disease, and should go to the ordinary school. He went to an elementary school, and six months later came an indignant letter from the secretary of the Children's Care Committee accusing me of having done an irretrievable amount of harm by sending the boy to the elementary school, because he had a fresh attack of hip disease. He simply had a recurrence of the old disease three or four years afterwards, although there had been no sign of it all that time. So that a boy with hip disease in London, having returned to his home, is still in a condition in which he wants care, attention, and watching. He must not mix with the ordinary rough, healthy boys ; he must be made to lead a quiet life, kept from any risk of injury to his hip, and at the same time he must be educated.

It is for that type of child and for the paralysed child who can walk with or without the aid of surgical instruments, and for another type of child who is not a cripple but an invalid, a child with heart disease—it is for these children that invalid schools in London have been instituted. These also are schools originated by voluntary effort. The first one was started about 1898 at Tavistock Place, the Passmore Edwards Settlement. They are schools where children who are crippled or invalid can be taken and taught in small classes

to get more individual attention and teaching than in the large classes of elementary schools. They can be better watched there, and also can have in out-of-school hours more supervision than is possible with large schools. Such invalid schools are important and valuable means for following up crippled and invalid children in such health that they can remain at home.

Unfortunately, a large number of cripples in London must be taken into the day schools at stages when they ought to be lying down in a country home. There are many of the elementary school children who should be in a special hospital ; they are in the day school by force of circumstances, because there is not sufficient accommodation for them at the present time elsewhere. The real use of an invalid day school is for educating and following up the crippled child when there is no longer any active disease or need for treatment other than that which can be easily obtained by an occasional visit to an out-patient department.

It is not possible to say much as regards out-of-school care, because the care required for children of different classes varies immensely. For instance, the child with tuberculous disease of the spine or hip is often kept recumbent on a splint, and out-of-school care then consists in seeing that the child is on the splint. A boy patient of my own, having tuberculous disease

of the knee-joint, was supposed to be wearing a splint which keeps the affected leg entirely off the ground. This boy was brought out amongst others at a cripple school for me to see, and he had no splint on. I said, "Where's your splint?" The nurse looked at me and said, "He's got no splint." I said, "Yes, he has, when at the Metropolitan Hospital, where I've seen him for the last two years." She said, "Well, he's never come to school in it." He had tuberculosis of the knee-joint and was doing very badly. This discovery at the school was quite sufficient to show why. The boy had had his treatment at the hospital, but apparently his parents were not carrying it out, and the splint was only put on when he visited the hospital. This is one of the troubles of splint treatment in the out-patient departments. Over and over again children who should be in splints constantly are allowed out part of the day without them for a treat. Occasionally I have heard that the splint was only for the boy to go to the hospital in; indeed, one child who had a nice leg splint was only allowed to wear it on Sundays. Watching that the splints are constantly worn is, then, the first and most essential part of the out-of-school care of cripple children who are under treatment.

Those of you who have not been in touch with the care of children wearing splints will be surprised to know the carelessness of parents

in looking after these things. I have seen two children this afternoon who were given boots six months ago at the hospital, and in each case the sole of the boot was worn through completely with the foot on the ground. With an ordinary boot that means throwing it away after six months' wear, and spells waste. But a boot made as a surgical instrument means still more ; for there is not only the waste of the boot, but the steel part of the instrument gets worn through as the result of walking on it instead of on the sole of the boot, and will cost a couple of pounds to put right instead of the expenditure of four or five shillings for repairing the boot in time. In this way there is gross and excessive waste of money. These people pay only a trifle towards the cost, and apparently without actually paying they attach little value and do not take the same care as if they had to pay for it. The care taken is very small, and when they get surgical instruments and apparatus constant supervision is necessary. A joint instrument, too, will only keep going and work well if oiled occasionally.

It is essential that a child who has had tubercular disease, or a bad back, or paralysis, should be properly cared for and fed ; its general health requires close attention, both in and out of school.

Crippled children, particularly the tuberculous ones, are very liable to a recurrence of the disease,

so that care beyond school and beyond hospital is necessary to watch for any signs of recurrence.

It would take an hour's lecture alone to tell you all the signs of tubercular diseases, but practically one can make this statement: Directly a child alters its habits in some way there is suspicion—that is, there must be a cause for the change. For instance, if a child who has had disease of the spine and has been walking all right and looking well suddenly walks awkwardly, stoops or leans on the table, or puts his hands on his knees, then there is something wrong, something which makes it painful for him to hold himself up straight. Similarly a child who has had hip disease, who has been walking fairly well, may suddenly commence to limp. Any alteration in the ways of a child requires explanation, even if it has not had disease; refusal to pick up toys, little pains or stiffnesses, altered habits must be regarded by parents and others as possible signs of early disease or its recurrence.

In London, and I suppose in most other large towns, there is another point about out-of-school care and out-of-hospital care of the cripple child. The number of cripple children who are capable of improvement and capable of being made to walk better than they do at present is very great. Hospital care of cripple children is, however, a very special thing. Treatment of a paralysed child probably requires not so much medicine

and surgery as a knowledge of mechanics. Unfortunately, a large number of these children are taken to hospital and come away with no benefit, and the reason is that they have gone to the wrong place. They should go to a surgeon who has an interest in and understands mechanics. I have seen a child under treatment for three or four years for paralysed legs—persistent electric treatment of the muscles—but that child could not walk because the legs were in the wrong position. It was not that the muscles were not strong enough, but that he was trying to walk in a position which was mechanically impossible. The physician probably had not studied mechanics, and did not understand that his energies were being wasted until the boy's legs were straight. There are, unfortunately, many children in London at present capable of improving, but they do not get improvement. One of the things done in our cripple schools is to sort out these children and get them improved. One has children, on the other hand, for whom treatment of any sort has to be abandoned. In the last half-dozen years I have known perhaps thirty children who had infantile paralysis of both legs, whose treatment has been abandoned completely and they have not been able to walk. I have had cases in which failure to improve was not my fault but the fault of the parents, for treatment would be started and then the case

would disappear for six months. We would start treatment again, and again the case would disappear, and we could never get beyond that. On the other hand, a boy was in the out-patient department, but treatment failed. A friend of mine took him into a cripple home, and two years afterwards told me that the boy had been walking about in splints for six months. So much for what a residential home outside London can do in these cases. But there are hardly any children who suffer from infantile paralysis who cannot be made to walk ; almost every one, even children with arms and legs paralysed, can be got on to their legs and taught to walk. That is one great point with paralysed children—sort out those for whom treatment has been abandoned and go on trying again. Of course, there are classes of children who are, unfortunately, incapable of any improvement.

The cripple leaving school is obviously at a disadvantage in the ordinary labour market as compared with a sound person. This matter is rightly obtaining attention, because in connection with crippling through war conditions the number of cripples to be dealt with at the end of the war will be very large, and it is right now to consider what can be done to enable them to compete with healthy, sound persons in the labour market. Fortunately, we have a considerable experience of placing children in the labour market out of the

cripple schools. It is essential that any one who is in any way crippled should have a particular, special, and skilled trade. It is no use putting the cripple on the labour market to do ordinary casual labour.

With this end in view three different types of work are going on. In the first place are those institutions which are most recent, the residential institutions for teaching cripple children trades; there are several of them in this country, a number on the Continent, and a number in America. In London there are some cripple schools in which the first rudiments of a trade are taught to the boys and girls whilst in school. Perhaps the trade that is most completely taught is fine needlework, taught to girls in two of the London invalid schools for a sufficiently long period to enable many of them to go direct to good situations when they leave school. Boys are taught boot-making, tailoring, carpentering, and woodwork, although the last named is not taught them literally as a trade; they take it up afterwards, the intention being rather to make them handy.

So that there are trade residential schools and trade classes, and the institution known as the After-care Committee for the placing of these children in suitable occupations. The work of the After-care Committee involves an enormous amount of out-of-school work for visitors—visiting the homes of the children, arguing with the

parents—a most difficult thing it is to get parents to see that "it is worth while." It is difficult to persuade a parent to let a boy learn a trade which will take five years, not bringing in at once more than five or six shillings a week, whereas if he went on a van he would get ten shillings a week or more, and it is very difficult to make clear the advantages of regular training. Then there is the work of visiting places where it is proposed that the cripple or other children should work to learn a trade. It is not possible to rely on the statements that are made about situations. On paper they seem to be the most comfortable places that a cripple boy could go to, but when visited they often turn out most unsuitable. These places must always be visited.

As regards the value of care of cripples to the community, if it were just a question of letting them die and letting them live, I think there would be something in the argument that care is not worth while. But they do not die.

In the case of tuberculous children a proportion of these die, but a considerable proportion, even neglected and without treatment, manage to live into adult life; these are found in cripple homes, without education, without trade training; the cripple who is going to live in this way is an absolute drain upon the community.

Take the child with infantile paralysis. Unless it dies within the first week of paralysis, except

for paralysis the health of that child is later as good as that of any other person of the community ; and if the child is left to grow up without care or education to make him sound again if possible, then he is left to be a drain on the community, instead of a help able to do useful work. So in the matter of letting the children live or die it is simply a question of making those who live and survive as good members of society as possible.

The same people who complain of protecting cripples will ask of what value they are, not to this generation but to the next. This is a more important question, but only a very small proportion of these cripples—not more than 1 or 2 per cent.—are congenital. These children who are born cripples, if they grow up and have children of their own, transmit a tendency for their children to be cripples. For example, the course of congenital crippling is seen in a mother with five children all with club foot.

There is a second group, the tuberculous child or cripple ; there is little doubt that if these become parents their children are liable to become tuberculous. A very large proportion of tuberculous cripples are the children of tuberculous parents. There is much talk at the present day especially in regard to bone tuberculosis as a tuberculosis produced by tuberculous milk. It may be true that tuberculous milk has something

to do with it, but more and more I find tuberculous children are the children of tuberculous parents ; and I feel that as mothers and fathers of another generation cripples, especially tuberculous or congenital cripples, are not valuable members of society. That, of course, is a question of eugenics, one of extreme difficulty, and just alluded to in passing because raised in relation to caring for cripples. The great reason for caring for cripples is that unless cared for there will be left cripples in a worse condition than they need be—that is, uneducated and untrained.

In answer to a question, bandy legs ought to be abolished. There are fewer such cases in London than there were ten years ago. In Glasgow they used to be very common, but now they are said to be rarer every year. Bandy legs do not come because children walk too early ; they are due to rickets ; no child will get bandy legs unless he has got this disease, and if you get a child well and properly fed you will get rid of rickets. Possibly the reason why bandy legs used to be so common in Glasgow was because the children fed mostly on porridge. A common cause of rickets in children is an excessive starchy diet and too little fat.

As to the treatment of bandy legs, the parent is first told how the child ought to be fed ; that is the essential thing. Cod-liver oil and malt with perhaps an iron tonic is recommended, and

they are told to come back in a month. Do not keep them off their feet, but let them run about, and watch them, until they are about four years of age. By that time if the bandy legs have not disappeared they are rapidly disappearing. At the age of four an operation may be required and can be done. Bandy-legged children can be let run about, because bandy legs are not a deformity produced by standing. Rickets is a disease due to faulty diet, in which the bones are soft, and they mould as a result of pressure. The moulding of the legs gives them the bandy position, which is not due to standing. Sit a bandy-legged boy on the table with his legs crossed, and they fit into each other ; the pressure is in the sitting position and not through the pressure of standing. That is why a child need not be stopped running about ; let it exercise, but give it plenty of nourishment. In this I differ from a number of other surgeons, but have always followed the treatment, and do not believe it has any ill-effect. A rickety child is not deformed by standing, because if so the legs would be bent in the opposite direction.

AFTER-CARE: THE SPECIAL NEEDS OF THE ADOLESCENT BOY AND GIRL

By R. A. BRAY, M.A.,

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When I was asked to give this lecture, the last dealing with the care of the school child, I had a certain hesitation in accepting the invitation. Looking down the syllabus, it seemed to me that these lectures dealt with purely health questions, and when I considered what I might have to say on the purely health aspect of after-care, the special needs of the adolescent boys and girls, it seemed to me at first that I might not have sufficient material to make a lecture. Not, indeed, that the needs for care of such kind were unimportant, they were too obvious ; it was clear also that any care carried out during the school year as regards health must be carried out with even better supervision during those important years when the child is moving out of childhood to maturity. Naturally in these lectures you would probably expect to find that with such a period of importance as that period

of the child's career I should be able to put before you some elaborate organization whereby the health of the child was followed up during this period. But when I came to think of what organization this country had put forward I was afraid that the organization would consist rather of gaps than of organization, and so had a certain hesitation. But I was told not to confine myself purely to the health question ; I might deal also with the machinery that is growing up with regard to the employment question, which may very well be used for assisting the needs of the adolescent boy and girl.

Let us take for the moment, first, what is actually done at the present time by legislation with regard to the health of the adolescent boy and girl. The Factory Acts prescribe a certain minimum of sanitation in the factory, a certain minimum of precautions against accidents, and a certain minimum of medical inspection. No child can be employed in a factory (and here "child" under the Act means a child still in attendance at school) unless the child is certified as medically fit for the work by the certifying surgeon. That is for the child still at school—what we probably know fairly well as the half-time system. A child cannot be employed under the half-time system without a certificate from the certifying surgeon. Secondly, when this child leaves school and becomes a whole-time

worker in a factory, or when any person under the age of sixteen enters a factory, he or she has again to be inspected by the certifying surgeon, and the employer must receive a certificate that this particular boy or girl is fit for the work in which he or she may be engaged. Further than that, it is part of the duty of the certifying surgeon when he goes round a factory to give an eye to the boy or girl who looks a little ill, and medically examine that child, and tell the employer if he thinks right that this or that particular child is not fit for that particular employment.

Looking, then, at the law just as it stands limited to the Factory Acts, it would seem that there was a system of supervision of the health of the child, at any rate, engaged in a factory. Unfortunately, in the working out, the system has come to grief altogether ; it is practically worthless in the greater part of this country, I believe, merely because the factory surgeon has not carried out the duties for which he was appointed. There is a vicious system lying at the bottom of it. First of all, the officer appointed is not some special officer who has other public duties ; he is in general an ordinary private practitioner, and he is paid for this work by the employer and not by the State Authority. He is therefore and regards himself as merely the servant of the employer, and as a matter of fact to a large

extent his medical inspection is perfunctory. I was told only the other day by one factory doctor that he had never in all the course of his career rejected any child employed in a factory on medical grounds. Now, any one who knows the condition of health of the children who are employed in factories is aware that a considerable number of them are quite medically unfit for the work they are carrying out.

We may say, then—and I am afraid it is true of practically the greater part of this country—that these factory surgeons are private practitioners, are always paid by the employer, and that their work is carried out in a most perfunctory fashion, so that what was intended as a sort of system by which at least the health of adolescents under the age of sixteen could be kept under supervision has become practically worthless. A very slight reform, which could be carried out by administrative action, without legislation, would at least work very significant results. Supposing the Home Office—for the Home Office is the authority—were to say—and they could say it immediately—that they thought it desirable that the factory certifying surgeon should be on the staff of the school doctor of the Education Authority. Think of the advantage which would at once accrue! The school doctor has had these children under medical examination while at school, he may have

examined them shortly before they went out to work, he has the medical history of these children, all tabulated ; that doctor would be the doctor to certify whether or not the child had taken up employment for which he or she was medically fit. Now, without legislation and by administrative action the Home Office could carry out this reform. It would require, no doubt, the consent of the Education Authorities that their officers might do the work, but as no additional expense would be involved this great sanitary and health reform could be carried out without any difficulty and without any sort of legislation. Then the system set up by the Factory Acts would give some guarantee that as regards boys and girls employed in factories, they were being employed in occupations for which they were physically fit.

But of course this would touch merely a fragment of the work in which boys and girls are employed ; it would affect only factories—that is to say, factories where more than forty people are employed or where the Home Office might say that a certain workshop which generally employs less than forty people shall be regarded as a factory. A large amount of employment to which boys and girls go does not come under the Factory Acts at all, and so far as those trades are concerned there is no provision that they shall be supervised as the law at least

provides in the case of boys and girls engaged in factories.

There is one other Act which requires mention, and that is the Employment of Children Act, which gives certain powers to the local authority, whether it is the town council or the county council as the case may be; it is limited, unfortunately, to boys and girls under the age of fourteen, so that it touches only a fringe of the subject. Under the Act the local authority may make by-laws, with the consent of the Home Office, prescribing the age under which children may not work. In London, for example, by those by-laws it is illegal for any boy or girl under the age of twelve to engage in paid work. It may, further, make regulations with regard to the conditions of employment in specified occupations; it may forbid the employment of boys and girls altogether in certain employments or occupations, especially such occupations as street trading. For girls the moral question is of greater importance than the health question. And further, the local authority may limit by its by-laws the number of hours which boys and girls still in attendance at school may work outside school hours. It is an Act which gives powers; they are limited powers and do not in any sense interfere with the Factory Acts—i.e. under these by-laws you could not make a by-law which infringed the Factory Act in the sense of preventing

what is known as the half-time system. Fortunately, in the greater part of the country it has disappeared altogether, but the half-time system in some of the northern towns connected with the woollen and cotton industries flourishes to the disadvantage of the children.

Taking these two Acts, they at once exhaust the whole of the machinery which has been set up for guarding the health of boys and girls who have gone out to employment—that is to say, during the most critical part of their career. It is obvious that unless something else is done the health of the boys and girls, which is being looked after with the greatest care in school-time, may suffer, and that work and expenditure may be wasted because there is no after-care of their health.

The child who has weak lungs may have been looked after carefully in school and goes into, say, a printing factory, and in that unhealthy atmosphere develops tuberculosis for want of supervision; or the delicate child with something wrong, maybe only temporarily, with the heart, takes up the hardest form of work, and breaks down completely. So it is that one finds more and more that just for the want of this particular after-care supervision there is a real sacrifice of the health of adolescent boys and girls, and a very large sacrifice too of all the careful work done by the school doctor, by the

nurses, and by the large number of volunteers who take part in school work.

Now there is growing up from quite a different direction a new organization which is catching up the juvenile as he leaves school and is following him up after he leaves. It is growing up largely on a voluntary basis. As the organization is new it may be of some advantage to explain this new organization for after-care, dealing with the problem of unemployment and the health of boys and girls. It has grown up really out of legislation which originally created the Labour Exchanges, appointed to deal with the problem of employment as regards adults, and, of course, also as regards juveniles. But it was obvious from the start that the problem of juvenile employment was a very different thing from the problem of adult employment. The adult had chosen his trade, whether for good or ill; he had at least his own organizations, the trade unions, to look after his interests, and he was grown up and could decide for himself. But where you were dealing with juveniles, boys and girls leaving school, it was clear that something more than merely mentioning to a boy or girl that there was this or that vacancy, and leaving it for the boy or girl to take or decline, was necessary. Consequently there have been created committees to deal with the question of employment, to advise boys and girls as to what

employment they should take up, and to keep in touch with the boys and girls after they have been placed out in employment.

These committees are of two kinds; some are called Juvenile Advisory Committees where they have been formed as committees of the Board of Trade; others are called Choice of Employment Committees where they have been formed by the Education Authority; but so far as concerns the actual work done there is no serious difference between them.

For several years I have been Chairman of the Juvenile Advisory Committee of the Board of Trade in London, and it may be of interest if I explain the kind of work carried out by these Committees. Firstly, a Central Committee organizes local committees in connection with the local Labour Exchanges, of which there are twenty-one in the Administrative County of London. These local committees consist of the following kinds of person: representatives of school Care Committees—the people in the district who have been interested in the children while at school, representatives of the teachers, head teachers of the different schools who have special interest in the employment of boys and girls. There is also in London, appointed under the Council's Medical Officer of Health, the school doctor for the district. The school doctor should be in close touch with the whole health question of

school children. In addition there are representatives of employers, representatives of trade unions, and other persons who are interested in social work generally. Therefore in connection with each of these Labour Exchanges there is now a committee of volunteers, all of whom have either some special knowledge of or interest in the problem of juvenile employment.

Their work consists of three parts. In the first place, shortly before a child leaves school the question of the employment of that child is brought to the notice of the child and his parents. Usually there is a meeting in the school, attended by a representative from the Labour Exchange, a member of the school Care Committee, and very frequently one of the responsible teachers of the evening schools. There the question of the employment of the child is considered and discussed, and a form is filled up, called the School-leaving Form, in respect of every child. That School-leaving Form records particulars of the child's career, showing whether he has displayed any special ability and the kind of employment the head master or head mistress thinks most suitable. Next there is the report of the school doctor on the last medical examination of this child, showing in simple language whether the child is suffering from any physical defect which would make certain forms of employment unsuitable. The Medical Officer for London

has drawn up a form of report in perfectly simple language which any ordinary person can understand. It may be that the parents have got plans for the child's future ; in that case nothing more is done. But in a considerable number of cases the boys and girls and their parents have no particular ideas as to their children's employment. All School-leaving Forms are sent to the local Labour Exchange. Where a child has expressed a desire to obtain work through the Labour Exchange that form is marked in a special way.

At certain intervals, about twice a week, are held at the Labour Exchange small sub-committees of the Advisory Committee, consisting of just a few people who will come in the evening to help in assisting the children to obtain employment. To these meetings are summoned the children who desire to make use of the Labour Exchange and their parents. The committee have before them, first, the School-leaving Form, showing the child's school career, his health, and what he or she is best suited for. Further, they have particulars of the vacancies notified to the Labour Exchange, not only in the one Exchange but by a certain system vacancies in all parts of London. When therefore the child comes with his parents the committee have, first, full particulars of the child, including the health question, and secondly, full particulars of the

various vacancies that are available. At that meeting it is often possible to put the boy or girl into the vacancy for which he or she may be best suited. Of course, very often there may not be a suitable vacancy, and the committee then recommend the kind of work the boy or girl should take up, and it then becomes the duty of the Exchange to endeavour to find such work, whether in the district or in other parts of London; and so eventually the children get placed. You see, so far as the children using the Labour Exchanges are concerned and so far as they are placed out by the Labour Exchanges, health questions have full weight given to them. The committee have the last medical report on the child and a memorandum prepared by the Medical Officer of Health on the different trades, showing what trades are unsuitable for children who may be suffering from certain special defects. If therefore the child takes the advice which may be given him in connection with the Labour Exchange, he is prevented entering unsuitable occupations. That is the second part of the work, the placing of the child, with a full knowledge of the child's career, including his health history, and, on the other hand, with full knowledge of the various vacancies that are available.

The third part of the work is no less important, and it is this: A system is set up by which an

attempt is made to keep in touch with the boys and girls after they have gone out to employment and to obtain for the Exchange periodical reports showing how they are getting on in their employment. Of course, a mistake may have been made; the child may have been wrongly placed, and it is important to find that out. He may have been doing work for which he is not physically fit through the character of the work not being exactly known when he was placed. He may be breaking down in health, and knowledge of this should be brought to the Exchange. When such a report is received the child is sent for and the parents, matters generally are talked over, and perhaps the child is advised to leave and other employment is found. By this system, which is now growing up, and so far as it is carried out, means are provided for keeping in close touch with the children who have gone out to work. In London at the present time there are between three and four thousand volunteers who take part in keeping in touch with the pupils who have been placed out to employment and send in periodical reports to the Labour Exchange showing their progress. During last year something like 23,000 reports were received from these volunteers at the Labour Exchanges, and on those reports a considerable amount of work and energy have been expended.

During last year 56,000 children registered at

the Labour Exchanges. There are between the ages of fourteen and seventeen—the ages dealt with by the juvenile side of the Labour Exchanges —something like 190,000 juveniles in London, so that in one year more than a third of the juvenile population registered at the Labour Exchanges, and of the remainder of the 190,000 a very large number passed through the Labour Exchanges either one or two years before. We may claim without any sort of exaggeration that more than half the juvenile population register at the Labour Exchanges or are dealt with by those organizations, and so far as the machinery of after-care work is complete are brought into the general method for supervising boys and girls. This large machinery has been developed in the last few years and has grown rapidly. Its growth marks the beginning of the supervision of the health of juveniles after school-days; for if we want to deal with the needs of the adolescent boy and girl we must study at first hand the question of employment. It is quite clear that there are many forms of employment unsuitable for boys and girls. We want to find these out; we want to get sufficient evidence to strengthen the hands of legislators in order that where occupations are shown to be unsuitable for juveniles they will be forbidden to take part in them. Various inquiries have been carried out which one hoped might have led to legisla-

tion but for the war. The London Juvenile Advisory Committee have carried out very elaborate inquiries as regards hours worked by boys in shops, warehouses, and places of that sort ; and the number of hours that the greater number of these boys were working was something from sixty-four up to seventy-four a week, obviously hours of work which no child could bear without suffering real bodily injury. Now all that information is ready to hand when questions of limiting the hours of juvenile employment come up. But for the war there is not the least doubt legislation having some effect on the hours of juvenile work would have been carried out. So far as this work continues, apart from the actual advantage the children are deriving from the organization, it is gradually collecting detailed facts which must be ascertained before we can get child and adolescent employment under proper State control.

Seeing that this big organization is dealing with juveniles in London at the rate of 56,000 a year, it may be of interest to use its experience to show how the war has affected young people.

If I wander into other aspects than the health side and deal a little with the incidents of employment, I hope you will forgive me. Let us take the question of the children still at school and working for wages. So far as the boys are concerned, there is not the least doubt that

the great demand for juvenile labour has increased to a serious extent the amount of work that is being done by boys outside school hours. Our evidence shows that the number of cases where the actual by-laws of the Council have been infringed has been considerable. The employment of school children is affecting different classes of schools in different ways. We may divide the schools, taking the social position of the parents as the standard of classification, into the good-class school, the medium school, and the poor school. In the case of the poor schools there has not been much increase in the amount of employment which is being done by boys, probably because boys always have done in these poor schools a large amount of labour outside school hours. In the medium schools there has been a large increase. The evidence is almost uniform for the whole of London; there has been an increase in the employment of boys outside school hours of from 20 per cent. to 50 per cent., and sometimes more. In the good-class schools there has been a slight increase.

There is, however, very little evidence to show that the actual paid work that is being done by girls outside school hours has increased to any considerable extent. Here and there there has been a certain increase in baby-minding. On the other hand, there is a very large increase

in the domestic work done at home by the girls. The demand for wages has probably induced a considerable number of mothers to go out to work and take paid employment, and on the girls whilst still at school has fallen a great part of the housework. A considerable strain has been placed on the health of the girls by this increase in domestic work put on them on account of their mothers going out to work. In some homes in fairly good condition where the father is on military service the maintenance allowance has not been sufficient to keep the family in the condition in which they were before the war, and the mothers are driven to earn. This does not affect the homes of the very poor, but in homes where the weekly income ranged from thirty shillings to forty shillings there has been considerable distress. Therefore it has been necessary in many cases for the mother to go out to work, and with women's work replacing that of men there has been a large demand for women. So far, therefore, as girls are concerned, though they have not had to do much paid work, there has been laid on them the considerable burden of increased responsibility for home work, and there is evidence in the schools that this has been having an effect. School doctors have noticed the physical effect this work has had on the girls.

As regards children who have left school, the

war has made an enormous demand, an absolutely unparalleled demand, for juvenile labour in all forms. The dominant factor as regards boys' employment during the war has been from the munition factories. The conditions in those factories as a whole have undoubtedly been very arduous in the case of the boys. In one of the largest the boys are employed for twelve hours a day seven days weekly. The factory is carried on night and day; for a fortnight the boys work during the day, then a change of shift comes and they work for a fortnight during the night; in all cases they are worked for twelve hours at a stretch, and so continue on each day of the week. For some considerable time there was no day off at all, unless the boy, as sometimes happened, failed to appear, and then usually he would be dismissed. Then an improvement was carried out, and they were allowed one day off once a fortnight when the shift was changed from the night shift to the day shift or from the day shift to the night shift; but so far it has not been found possible to prevail on the authorities who are responsible for this particular factory to give the boys one day off a week.

The boys themselves are reluctant that the hours should be shortened, because they earn very high wages, something like twenty-two shillings to twenty-five shillings a week—for a boy of fourteen fresh from school—and then as they

become quick at their work and as they get older their wages increase. In this particular factory it is rare to find a week where several boys aged sixteen are not earning as much as £3. It may be said generally of munition factories that the wages range extremely high. It is quite common now to get a considerable number of boys of fourteen at the Labour Exchanges who declare they will take no work unless they get twenty-five shillings—boys who before the war would have got eight shillings or nine shillings a week. One of the most difficult problems raised by the war has been these very high wages that are earned by these boys in munition factories. I estimate the number of boys working on munitions in London—boys between the ages of fourteen and seventeen—at something like one in three of all boys employed. I believe that the Home Office now is more careful in allowing these long hours, which are quite contrary to the Factory Acts and can only be allowed where the Home Office has suspended that part of the Factory Acts dealing with the employment of young persons.

Another unsatisfactory feature affecting the health side is that in many of these factories where they have increased enormously the number of boys employed, or in new factories where boys were not formerly employed, there has been grave lack of supervision over the boys. If boys

are worked long hours it is important that somebody other than the foreman should look after them, see at least that they get proper food, and supervise the canteen arrangements. At first there were no arrangements of this sort, but lately the Ministry of Munitions has taken the matter up, and are appointing Welfare workers in connection with munition factories—people who are not foremen but who possess a general knowledge of and interest in boys, whose duty is not to see that a boy does his work, but to try to look after the general interest of the boys.

The evil of long hours in some of these factories has been aggravated by the long travelling to and from work. These factories are only in certain centres ; they attract a very large number of boys, who often travel very long distances. It is common to travel an hour in the morning to get to work and another hour in the evening to get home, making the day's work fourteen hours. A considerable number of cases have come under my notice where the time between home and work has been one and a half and even one and three-quarters or two hours, a very long day for a boy.

Girls are only now beginning to be employed in any large numbers on munitions, working under similar conditions to the boys, for twelve hours at a stretch, and on night work. But the general supervision of the girls, carried out with the

experience gained in regard to the boys, is more satisfactory. A considerable number of capable women whose duty it is to look after the girls employed on munitions have been appointed. The number of girls so employed is comparatively small in London at the present time, but the figures are undoubtedly going up. My estimate is that something like 7 per cent. of the girls in London between the ages of seventeen and fourteen are engaged in munition work. They are generally being paid the same rate as boys, and being quick at this kind of work, are earning quite as high wages. But at present there are not many factories employing girls under sixteen.

The dominant factor as regards girls' work in London is the employment of girls to replace boys. We now have on a large scale the girl messenger, the girl van-guard, the tricycle girl, the office girl, and they are also employed in certain forms of manual work. Much of this employment does not seem satisfactory. It is not easy to substitute girls for boys in occupations where girls have not been employed before, and where women are not employed. There have been rather anxious times for many of us who are engaged in the work of the Labour Exchanges to ensure that where girls are being employed in the place of boys there should be some proper form of female supervision. I am afraid that in a considerable number of cases there is no sort of female super-

vision. Again, there is a good deal of work for which girls are physically unfit ; a considerable number of tricycle girls are riding heavy tricycles loaded with parcels for delivery from the different shops. So far as messenger work goes, while it is not work at which girls are learning anything, we find it has no bad effect on the health of the girls engaged, and where there is proper supervision of messenger girls it does not form an undesirable kind of work. In a good many places there is, however, no proper supervision, and then not only on health grounds, but for other reasons this form of replacement of boys by girls is unsatisfactory.

If I were dealing generally with employment and its problems, I should say that the chief effect on the employment of boys and girls comes from the fact that the training and preparation for any sort of skilled occupation are far less satisfactory than at any time before the war. Girls, for instance, who would be going into domestic service, dressmaking, or millinery now pass into what one calls " blind-alley " employment ; while in the case of the boys the high earnings have attracted a considerable number of boys away from trades where they could earn less but enjoy good prospects into highly paid occupations where there is no training. And even where they enter a skilled trade during wartime every effort is centred on increasing the

rate of production ; and where the employer is endeavouring to increase the rate of production there is generally less training found possible. So we have to make up our minds that after the war there will be a considerable need for making up the lack of training that the boys and girls have experienced during the war period. It is necessary further to consider the serious effect which this war form of employment is having on boys' and girls' character. The enormous demand has taken from them all inducement to persevere, for they feel that if they lose a job one day they can find another the next. The habit of wandering from place to place without any sort of discipline is only too common, and the high wages has led to a considerable amount of wasteful expenditure. We have made careful inquiries as to what the boys and girls have been doing with their earnings. There is little evidence to show that there has been any special saving ; but while, on the other hand, there has been a certain amount of waste, there has not been the considerable amount of waste that is generally represented. A good deal of these increased earnings has been put either into the children or on to the children ; children are much better clad, much better shod, and much better fed than before the war. And dealing with the health question, while the long hours worked would naturally affect their health, it is not easy to find that on any considerable

scale the long hours have had that effect. I do not say that the boys and girls can work these long hours without suffering somewhat, and no doubt ill-effects may become visible, but to any considerable extent these ill-effects have not become visible at the present time, and there is a general opinion among those dealing with the boys and girls that the grave effects which some of us expected would have been occasioned by the long hours have, at any rate, been postponed or mitigated by the much better feeding and clothing that the children now enjoy as compared with before the war. Then it was only too common to find in the Labour Exchanges boys and girls in considerable numbers who were obviously physically unfit, broken down in health, pale, ill clad and shod. That type has now practically disappeared. There is no doubt that the increased wages and the improvement in the standard of living among the working classes during the war has had an enormous effect on the health of the boys and girls. This fact brings home to us what some had realized before, that many of the problems of health we are dealing with are to a considerable extent problems of poverty as well—that unless we deal with this larger question of poverty we may never be able to deal adequately with the health side of the question. Everywhere poverty seems to bar the way to our reaping the full reward of our work. We

consider the question of infantile mortality and wonder why the rate in Shoreditch is double that in Hampstead, and we come back to the question of the poverty of the district. The poorer the district the higher the mortality. Various organizations are rightly doing much for infant care and some effect is produced, but everywhere those who are engaged in the work feel that to a very considerable extent the work that they are doing is being robbed of its result because of the poverty of the area. Is it a question of doing something for the health of the children in the schools? We may do something to deal with individual ailments, we may treat the eyes, ears, and so on, but over and above that I and those who have been connected with educational administration for many years still feel that there remains behind, robbing our work of a large amount of effect, preventing us doing anything like what we would wish, the spectre of poverty. Is it, again, a question of getting the boy or girl into suitable employment? There may be a clever boy who should have good prospects, and yet the poverty of the home drives him to take up work where the wages are high and prospects small. Though that boy should have risen high, poverty condemns him to a life of ill-paid employment and hopeless drudgery. The war has taught us, as never before, to realize the change which has been brought about by

banishing even for a time this spectre of poverty that has mocked all our efforts in the past. When the war is over, let this truth remain with us: The problem of health, whether the health of the infant, the child, or the adolescent, is a problem of poverty, and while poverty is still with us, do what we will, our ideals are destined to fall far short of fulfilment.

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